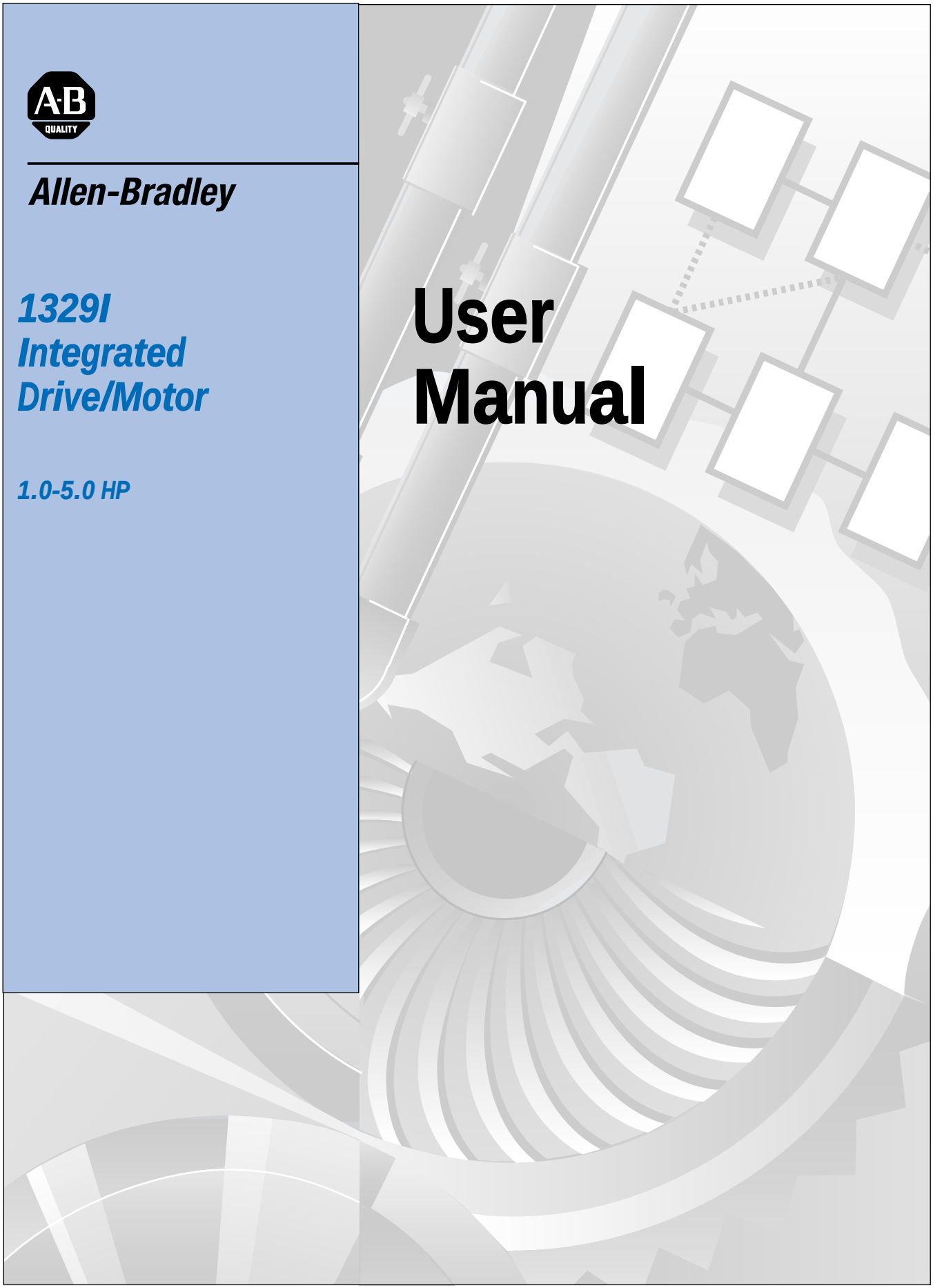

Allen-Bradley

1329I Integrated Drive/Motor

1.0-5.0 HP

User Manual

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Rockwell Automation publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Rockwell Automation office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Throughout this manual we use notes to make you aware of safety considerations:

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

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Appendix B **Product Features**

Appendix C **1329I System Diagram**

Appendix D **Installation Record**

Installation Checklist

This manual describes how to install, troubleshoot, and maintain the 1329I unit. Use the following checklist to guide you through the installation process.

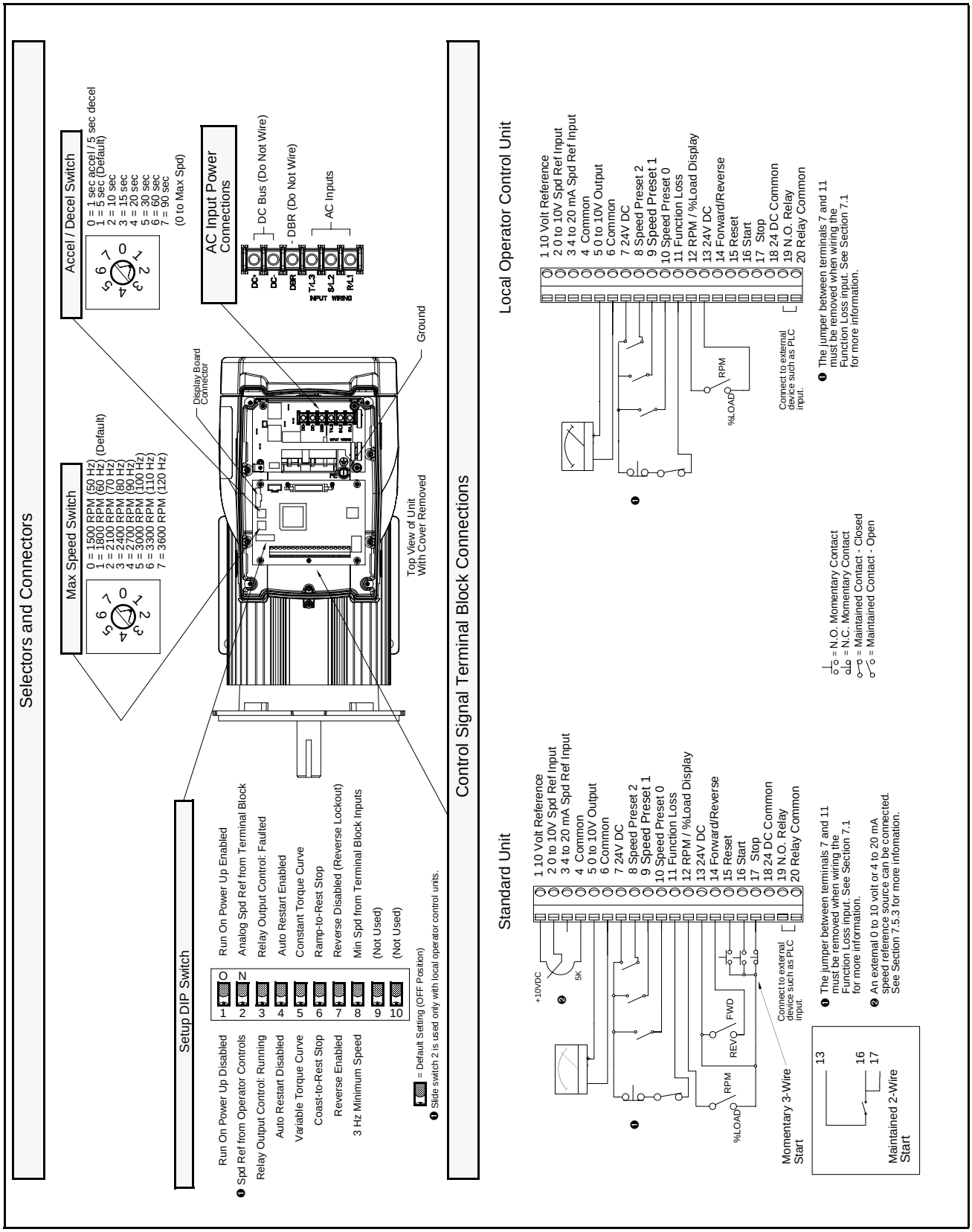
Installation Procedure		Read Manual Section(s)
❑ Step 1	Identify your unit	1.0
	Understand how the **standard unit** operates	1.1
	Understand how the **local operator control unit** operates	1.2
❑ Step 2	Plan the installation	2.0
❑ Step 3	Mount the unit	3.0
❑ Step 4	Install external components AC input disconnect Branch circuit protection Input isolation transformers	4.0 4.1 4.2 4.3
❑ Step 5	Wire AC power to the unit and ground the unit	5.0
❑ Step 6	Install a stop	6.0
❑ Step 7	Wire the control signal terminal strip	7.0
❑ Step 8	Verify the setup and adjust it if required	8.0
❑ Step 9	Check the installation Perform power-off checks Verify the direction of motor rotation Attach the cover Check the speed reference	9.0 9.1 9.2 9.3 9.4
❑ Step 10	Set the operating speed	10.0

If problems occur during unit operation, refer to Chapter 11 for troubleshooting guidelines.

Getting Assistance from Allen-Bradley

If you have any questions or problems with the products described in this instruction manual, contact your local Allen-Bradley distributor.

Installation Overview



Step 1 - Identify Your Unit

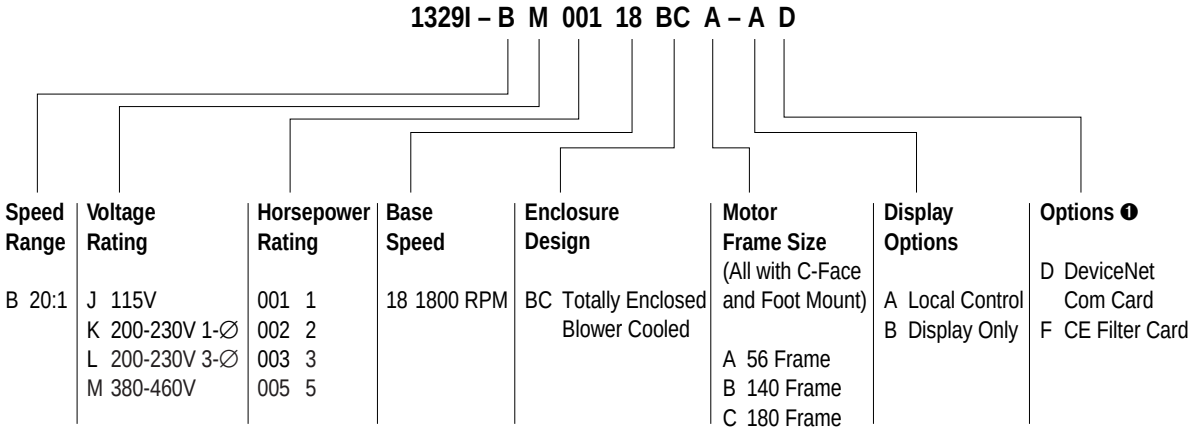
The 1329I integrated drive/motor is an AC drive integrally mounted with an inverter duty motor. Each unit consists of a Drive Section and a Motor Section.

The Drive Section is a single- or three-phase input, three-phase output inverter providing open loop V/Hz regulation. It houses the PC boards and the blower. The Motor Section is a four-pole, three-phase induction motor.

The unit's default setup suits a wide range of applications. Two rotary switches and a 10-position slide switch on the Control board are used to adjust the setup, if required.

1329I units are identified by catalog number. This number appears on the shipping label and on the unit's nameplate. Table 1.1 shows the format of this number and what it indicates.

Table 1.1
Catalog Number Format



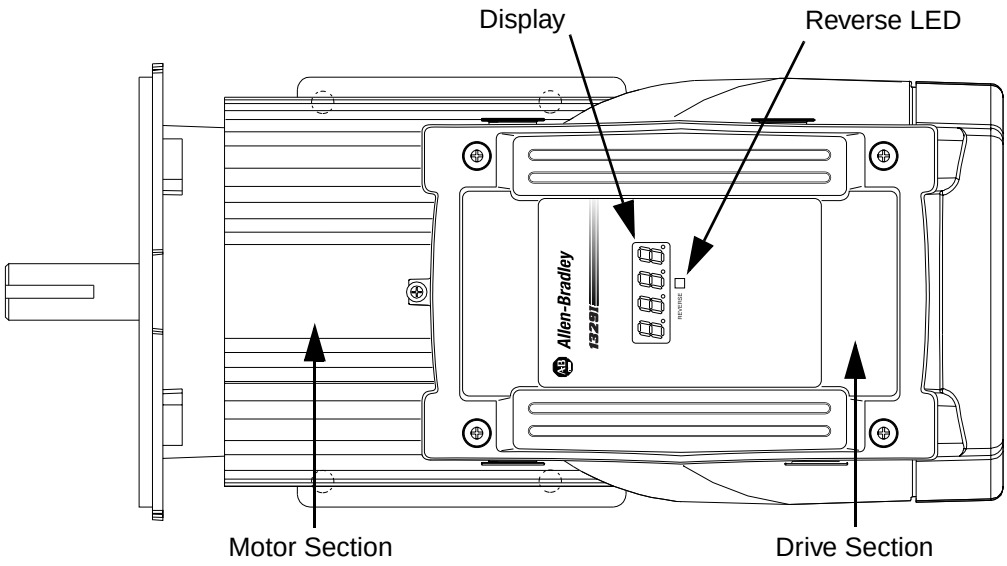
❶ Select one, either D or F only, not both.

Standard units, described in Section 1.1, provide remote operator control. Local operator control units, described in Section 1.2, provide local control.

1.1 1329I Standard Unit

The standard unit, shown in Figure 1.1, provides a local display for speed or percent load, and diagnostic information. A control signal terminal block in the Drive Section connects to a user-supplied remote operator control station.

Figure 1.1
1329I Standard Unit



1.1.1 Standard Unit Display Description

The four-character, seven-segment display shows the drive output speed in RPM or percent load, and displays active fault codes. Speed in RPM is the default display. To display percent load, see Section 7.4.

If a fault occurs, the unit displays the corresponding fault code. Refer to Chapter 11 for more information about fault codes and corrective actions.

1.1.2 Standard Unit Reverse LED Description

The REVERSE LED indicates the requested direction of motor rotation:

LED Status	Definition
OFF	The requested direction of motor rotation is forward. (The 1329I unit is shipped with the forward direction defined as CCW shaft rotation as viewed from the motor shaft end.)
ON	The requested direction of motor rotation is reverse. (The 1329I unit is shipped with the reverse direction defined as CW shaft rotation as viewed from the motor shaft end.)

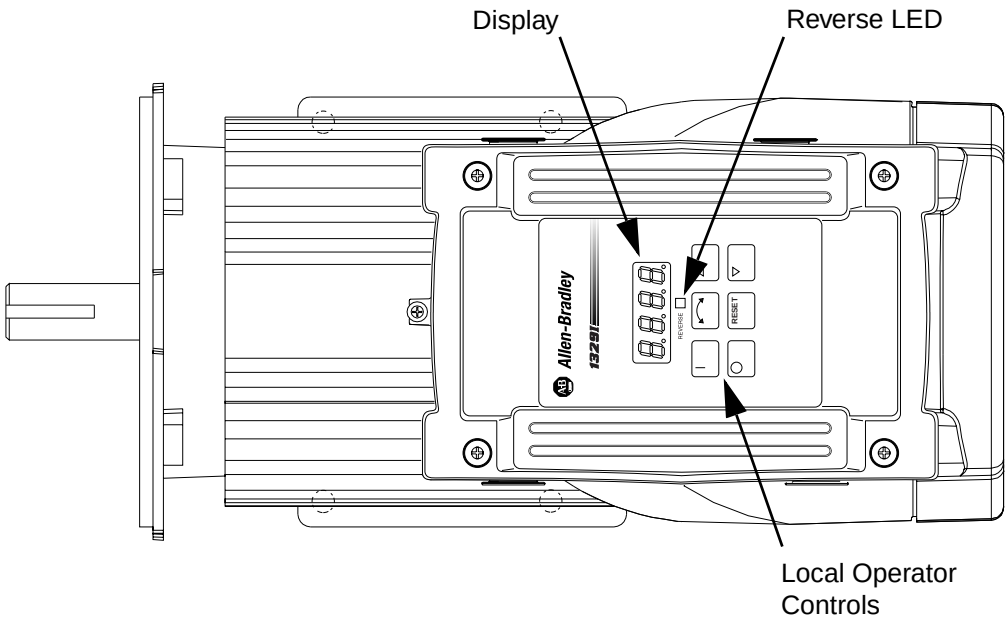
If the motor is turning and you request a change to motor direction, the LED turns on or off immediately even though it may take some time for the motor to decelerate and begin turning in the opposite direction.

1.2 1329I Local Operator Control Unit

The local operator control unit (see Figure 1.2) provides local start, stop, forward, reverse, reset, and speed control functions. The controls replace the Start, Stop, Reset, and Forward / Reverse input signals at the terminal block. For local control, you do not wire to these inputs

The local operator control unit receives its speed reference from the keypad (default) or the analog input terminals (user option). Refer to Section 8.3.2 for more information.

Figure 1.2
1329I Local Operator Control Unit



1.2.1 Local Operator Control Unit Key Descriptions

Figure 1.3 shows each key's function.

Figure 1.3
Local Operator Control Key Functions

The START key applies power to the Motor Section.

The FORWARD/REVERSE key toggles the direction of motor rotation.

Press the UP ARROW key once to display the current speed reference. Hold this key down to increase the speed reference value. The longer the key is pressed, the faster the reference value increases.

Press the DOWN ARROW key once to display the current speed reference. Hold this key down to decrease the speed reference value. The longer the key is pressed, the faster the reference value increases.

The RESET key resets any active faults or aborts an Auto Restart sequence. See the **Attention** statement at 8.3.4 for important information regarding the Auto Restart mode of operation.

The STOP key interrupts Drive Section output to the Motor Section.

1.2.2 Local Operating Control Unit Display Description

The four-character, seven-segment display shows output speed in RPM or percent load, the current speed reference, and active fault codes. Speed in RPM is the default display. To display percent load, see Section 7.4.

If a fault occurs, the unit displays the corresponding fault code. Refer to Chapter 11 for more information about fault codes and corrective actions.

1.2.3 Local Operating Control Unit Reverse LED Description

The REVERSE LED indicates the requested direction of motor rotation:

LED Status	Definition
OFF	The requested direction of motor rotation is forward. (The 1329I unit is shipped with the forward direction defined as CCW shaft rotation as viewed from the motor shaft end.)
ON	The requested direction of motor rotation is reverse. (The 1329I unit is shipped with the reverse direction defined as CW shaft rotation as viewed from the motor shaft end.)

Note that if the motor is turning and the key is pressed, the LED turns on or off immediately even though it may take some time for the motor to decelerate and begin turning in the opposite direction.

1.2.4 Operating the Unit Using the Local Operator Controls

Desired Action	User Steps
Start the unit.	Press the green [I] key.
Stop the unit.	Press the red [O] key.
Change the direction of motor rotation.	Press the [↶] key.
Clear faults or abort Auto Restart sequence.	Press the [RESET] key.
Decrease the speed reference. ❶	Press the [▽] key until the speed reference displayed is the desired value. The longer the [▽] key is held down, the faster the value decreases.
Display the current speed reference	Press the [△] or [▽] key once. The display returns to indicating speed in RPM or percent load after three to five seconds. Holding down either key will change the speed reference.
Display the speed in RPM	No action required; speed in RPM is the default display based on status of terminal 12 (see Section 7.4). If the [△] or [▽] keys are not pressed for several seconds, the display returns to indicating actual motor speed in RPM.
Display percent load	Close contact on terminal 12 (see Section 7.4)
Increase the speed reference. ❶	Press the [△] key until the speed reference displayed is the desired value. The longer the [△] key is held down, the faster the value increases.

❶ If the unit is using a preset speed reference (see Section 7.4.1), pressing the [△] or [▽] key will have no effect on unit operation.

Important: If the local operator controls are disconnected from or connected to the unit after power up, the unit will stop due to a non-resettable fault. Refer to Chapter 11 for information about faults.

End of Chapter

Step 2 - Plan the Installation

ATTENTION: Only qualified electrical personnel, familiar with the construction and operation of this equipment and the hazards involved, should install, adjust, operate, and/or service this equipment. Read and understand this instruction manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

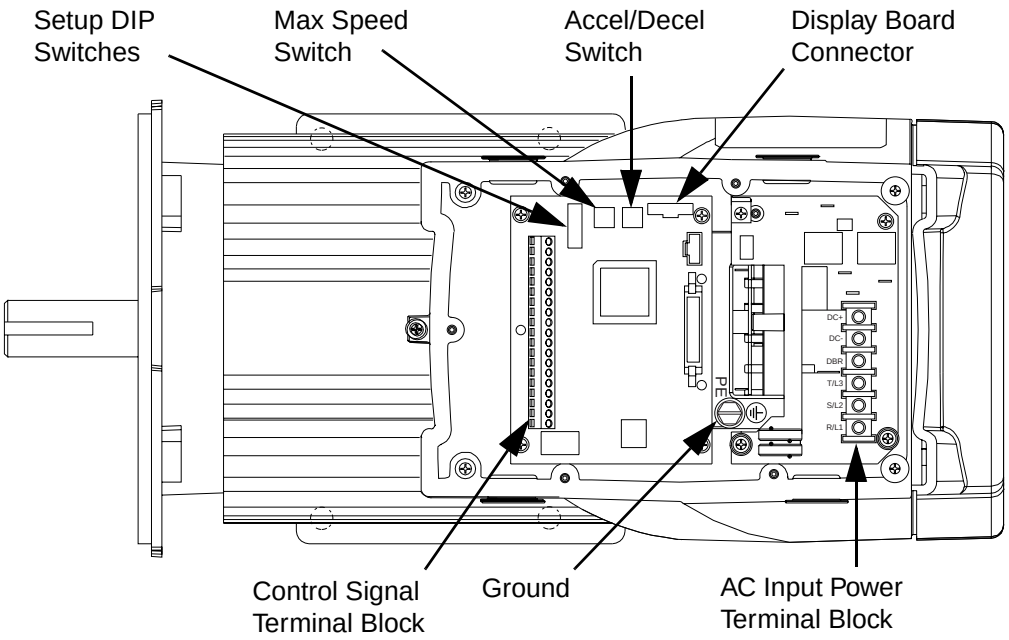
ATTENTION: This equipment is at line voltage when AC power is connected. Disconnect and lockout all ungrounded conductors of the AC power line before working on the unit. Failure to observe these precautions could result in severe bodily injury or loss of life.

ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in personal injury and/or damage to, or destruction of, the equipment.

It is the user's responsibility to ensure that this equipment is installed properly according to this manual and in conformance with all applicable codes. Consult your local inspecting agency for information about any local, national, or international codes that may apply.

Review all installation and wiring instructions thoroughly before proceeding. Throughout the installation procedures, use Figure 2.1 to locate wiring termination points and setup switches.

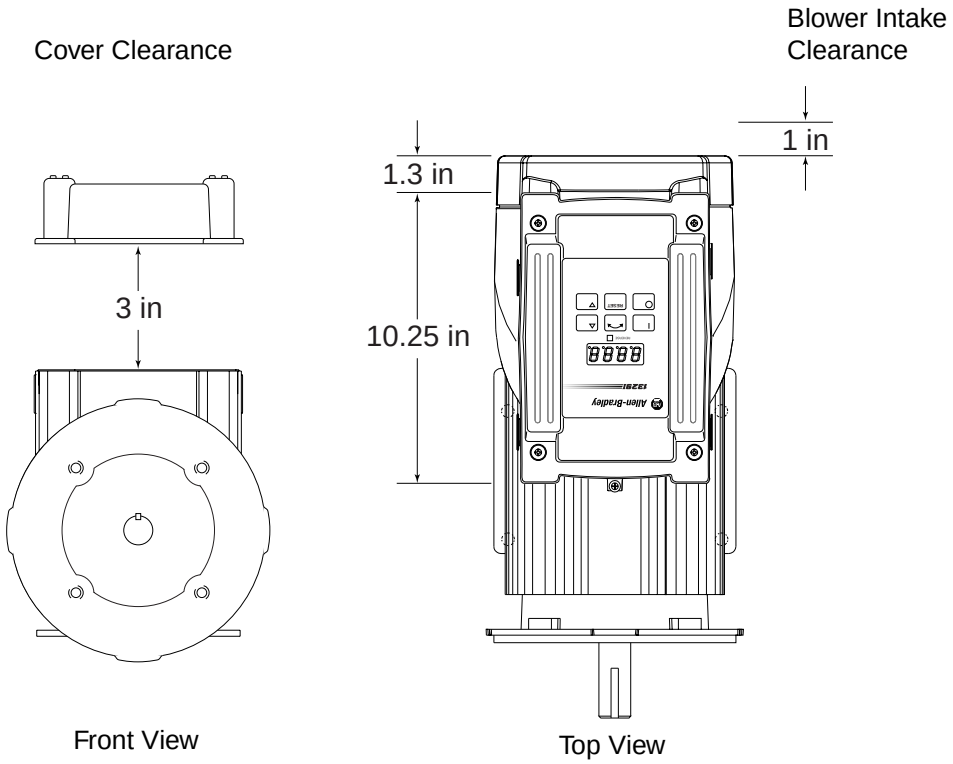
Figure 2.1
Component Location



Planning the installation is necessary to ensure you have acceptable environmental and operating conditions for the unit. Read and follow the requirements given below before proceeding with the installation:

- Locate the unit where it will have unrestricted clearance as shown in Figure 2.2.
- Locate the unit where it will be kept clean (away from oil, coolants, or airborne contaminants). The 1329I unit has an IP54/NEMA Type 12 rating. An IP rating designates the enclosure's level of protection. The first number in the rating (5) indicates that the 1329I unit is dust-resistant. The second number (4) indicates that the unit is splashproof.
- Mount the unit on a flat surface.
- Verify that the ambient temperature will remain between 0°C to 40°C (32°F to 104°F).
- Verify that the relative humidity will be between 5 percent and 95 percent, non-condensing.
- For installations above 1000 meters (3300 feet), refer to Appendix A for derating guidelines.
- Verify that there will be adequate clearance for opening the cover. See Figure 2.2.
- Verify that there will be adequate clearance for blower intake. See Figure 2.2.

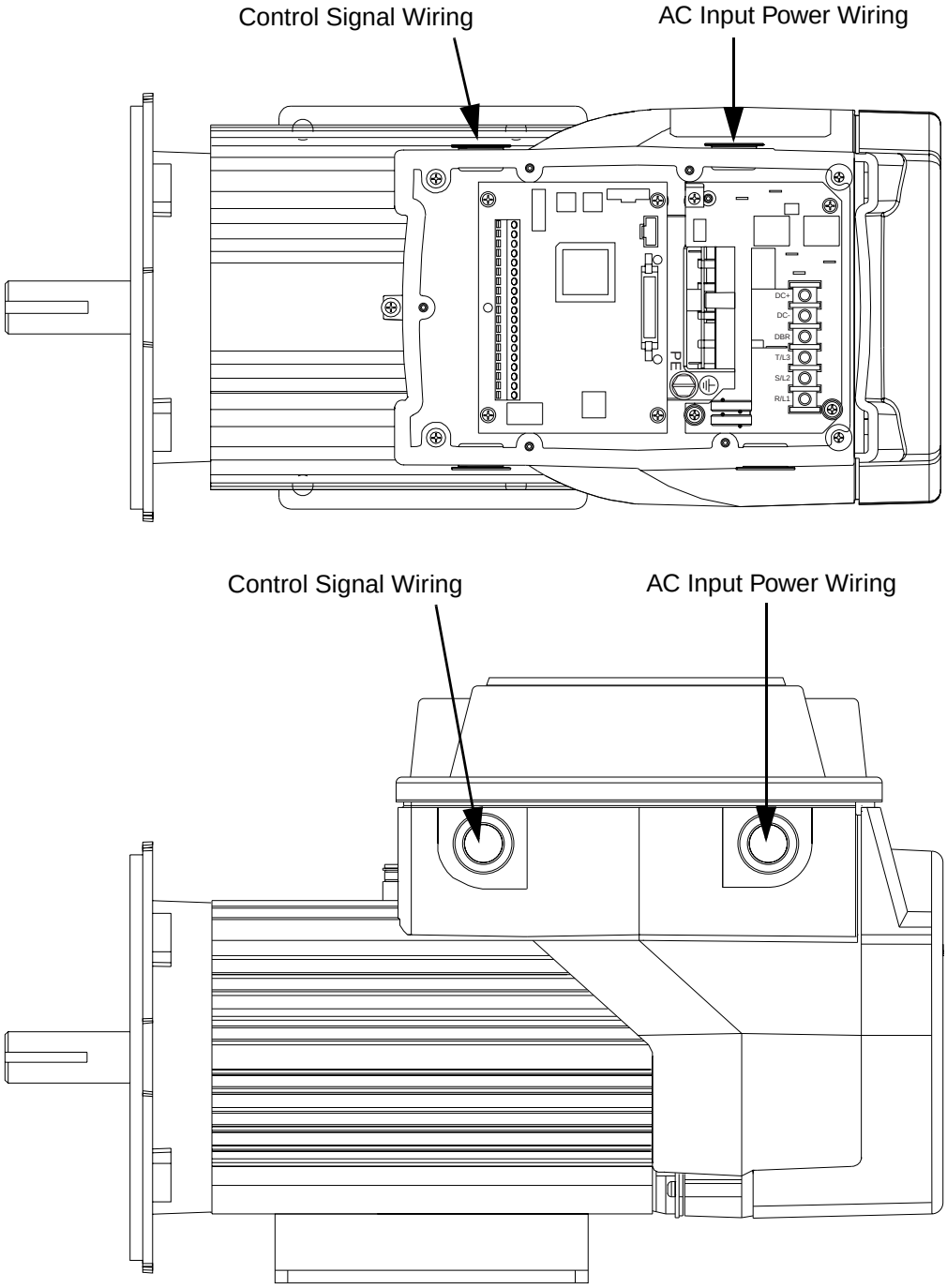
Figure 2.2
Access Clearances



2.1 Wire Routing Guidelines

The 1329I unit is shipped from the factory with plastic conduit plugs installed. These plugs must be removed. Before wiring, replace these plugs with appropriate 3/4-inch NPT connectors having a similar enclosure rating. After wiring, seal unused routing holes using permanent, user-supplied 3/4-inch NPT plugs. Seal all threaded connections. Route the power and control wiring as shown in Figure 2.3.

Figure 2.3
Wire Entry Locations



2.2 Handling and Lifting Guidelines

Follow these handling and lifting guidelines:

- In the case of assemblies on a common base, carefully lift the assembly by a sling around the base or by other lifting means on the base.
- When designing the lifting means, take care to assure lifting in the intended direction.
- Do not lift the unit by the plastic blower cover.
- Do not use any lifting means under the Drive Section.
- Do not lift attached equipment by lifting the motor.
- Do not use the 1329I unit as a step.

Step 3 - Mount the Unit

Mount the unit on a foundation sufficiently rigid to guard against excessive vibration. The unit may be mounted at any orientation. After carefully aligning the 1329I unit with the driven machinery, bolt securely in place.

When the unit is mounted vertically, it may be necessary to use additional guards to prevent foreign objects from falling into the motor fan openings and striking rotating parts.

Mounting dimensions are provided on the following pages of this chapter.

3.1 Mounting Guidelines for Face-Mounted Motors

Use the following guidelines when mounting 56C and 140C face-mounted motors:

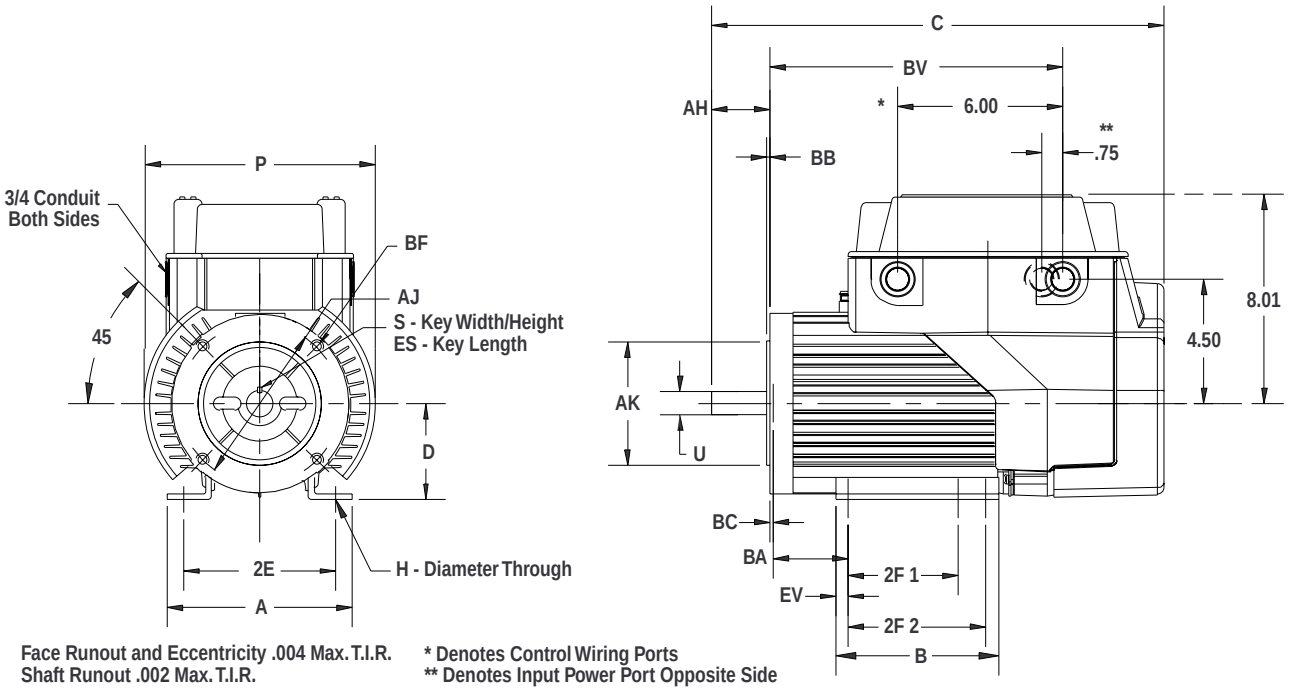
- Before mounting a C-face motor to the mating flange, be sure both surfaces and all mounting holes are smooth and free of debris.
- When mounting into a quill-type reducer, make sure the input and output shafts are coated with an anti-seize compound suitable for the application.
- When mounting through a flexible coupling, make sure that there is adequate clearance between the driven equipment shaft, the coupling interface, and the motor shaft. Insufficient clearance may result in binding of the shafting and premature bearing failure.
- Always slide the motor tenon into the mating flange to its full depth before tightening the mounting bolts. Do not allow the motor to hang by the shaft extension while assembling it to the driven equipment (for example, a quill input gear case) as this may bend or crease the shaft and damage any seals that are present.
- Make sure to use the proper mounting bolts. For 56C and 140C motors, these should be 3/8", 16 threads per inch, and sized for length such that engagement into the motor flange does not exceed 9/16”.

For example, a gearcase with a 3/8" flange thickness requires a bolt that is 3/8" + 9/16". That is, 15/16" should be the maximum bolt length. Since 15/16" is not a standard bolt length, a 7/8" bolt or a 1" bolt with a lock washer can be used.

Important: Using a bolt that is too long may cause damage to the motor resulting in premature failure and/or a loose assembly.

3.2 Mounting Dimensions for NEMA Frames

Figure 3.1
NEMA Frame Mounting Dimensions



Face Runout and Eccentricity .004 Max. T.I.R.
Shaft Runout .002 Max. T.I.R.

* Denotes Control Wiring Ports
** Denotes Input Power Port Opposite Side

Frame Size	Dimensions in inches (mm)										
	A	2E	H	D	BF	AJ	AK	U	AH	S	ES
56C	6.71 (170)	5.50 (140)	0.34 (8.6)	3.50 (89)	3/8-16	5.88 (149)	4.50 (114)	0.625 (15.9)	2.06 (52)	.19 SQ (4.8)	1.25 (32)
143TC 145TC	6.71 (170)	5.50 (140)	0.34 (8.6)	3.50 (89)	3/8-16	5.88 (149)	4.50 (114)	0.875 (22.3)	2.12 (54)	.19 SQ (4.8)	1.25 (32)
182TC 184TC	8.50 (216)	7.50 (191)	0.34 (8.6)	4.50 (114)	1/2-13	7.25 (184)	8.50 (216)	1.125 (28.6)	2.62 (67)	.25 SQ (6.4)	1.50 (38)

Frame Size	Dimensions in inches (mm)									
	BC	BB	BA	B	2F 1	2F 2	EV	C	P	BV
56C	0.19 (4.8)	0.12 (3.0)	2.75 (70)	6.50 (165)	3.00 (76)	5.00 (127)	0.47 (12)	15.90 (404)	8.38 (213)	10.14 (258)
143TC	0.12 (3.0)	0.12 (3.0)	2.75 (70)	6.50 (165)	4.00 (102)	5.00 (127)	0.47 (12)	16.46 (418)	8.38 (213)	10.14 (258)
145TC	0.12 (3.0)	0.12 (3.0)	2.75 (70)	6.50 (165)	4.00 (102)	5.00 (127)	0.47 (12)	15.96 (405)	8.38 (213)	10.64 (270)
182TC	0.12 (3.0)	0.25 (6.4)	3.50 (89)	6.50 (165)	4.50 (114)	5.50 (140)	0.50 (13)	18.75 (476)	8.80 (224)	12.39 (315)
184TC	0.12 (3.0)	0.25 (6.4)	3.50 (89)	6.50 (165)	4.50 (114)	5.50 (140)	0.50 (13)	19.75 (502)	8.80 (224)	13.39 (340)

Step 4 - Install External Power Components

Install external power components using the guidelines in the following sections.

4.1 Installing an AC Input Disconnect

ATTENTION: Local codes and laws require that an input disconnect be provided in the incoming power lines. Failure to observe this precaution could result in severe bodily injury or loss of life.

An AC input disconnect must be provided in the incoming AC power lines in accordance with local codes and laws.

4.2 Installing Branch Circuit Protection

ATTENTION: Local codes and laws require that AC branch circuit protection be provided to protect input power wiring. The input fuse ratings listed in Table 4.1 are applicable for one 1329I unit per branch circuit. No other load can be applied to that fused branch circuit. Failure to observe this precaution could result in severe bodily injury or loss of life.

Install the required, user-supplied branch circuit protection fuses according to Local codes and laws. Refer to Table 4.1 for recommended fuse ratings.

Table 4.1
Required AC Branch Circuit Protection

Input Voltage	Unit HP	NEC Amps Input	
		Input Current	Fuse Rating ❶
460 VAC	1 HP	2.3 A	3.5 A
460 VAC	2 HP	3.7 A	6.0 A
460 VAC	3 HP	5.7 A	9.0 A
460 VAC	5 HP	9.0 A	15.0 A
230 VAC	1 HP	4.5 A	7.0 A
230 VAC	2 HP	7.6 A	12.0 A
230 VAC (1-Phase)	1 HP	5.8 A	9.0 A
230 VAC (1-Phase)	2 HP	14.0 A	20.0 A
115 VAC	1 HP	14.0 A	20.0 A

❶ Recommended fuse type: UL Class J or CC, 600V, time delay.

4.3 Installing Input Isolation Transformers

ATTENTION: Distribution system capacity above the maximum recommended system KVA (100 KVA for 460 VAC three-phase, 5% impedance) requires using an isolation transformer, a line reactor, or other means of adding similar impedance. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Depending upon the requirements of the application, the 1329I unit may require input isolation transformers to help eliminate the following:

- Damaging AC line voltage transients from reaching the 1329I unit.
- Line noise from the 1329I unit being fed back to the incoming power source.

An isolation transformer or line reactors of 3% drive input impedance should be used between the distribution source and the 1329I unit in situations such as the following:

- The power distribution system feeding the 1329I unit contains power factor correction capacitors.
- The power distribution system feeding the 1329I unit connects with heavy industrial equipment that causes instantaneous line distribution shorts such as arc welders, line-commutated thyristor converters, or line-started AC induction motors greater than 50 HP (37 KVA).
- The distribution transformer is rated more than 100 KVA for 460 VAC with less than 5% impedance.
- The distribution system is prone to frequent power outages or transient power interruptions or significant voltage spikes.

Refer to Table 4.2 for the appropriate line reactor for your unit.

Table 4.2
Input Line Reactors

1329I Unit		Input Line Reactor		
HP	**Input Voltage**	**Inductance**	**Rated Amps**	**Part No.**
1	460V, 3-Phase	6.5 mH	4.0	1321-3RA4-B
2	460V, 3-Phase	3.0 mH	8.0	1321-3RA8-B
3	460V, 3-Phase	2.5 mH	12.0	1321-3RA12-B
5	460V, 3-Phase	1.5 mH	18.0	1321-3RA18-B
1	230V, 3-Phase	1.5 mH	8.0	1321-3RA8-A
2	230V, 3-Phase	0.8 mH	18.0	1321-3RA18-A

Step 5 - Wire AC Power to the Unit and Ground the Unit

ATTENTION: If the distribution system capacity exceeds the unit's maximum symmetrical fault short-circuit current of 10,000 amps, additional impedance should be added to the AC line supplying the unit to limit available current in the event of a fault. Failure to observe this precaution could result in severe bodily injury or loss of life.

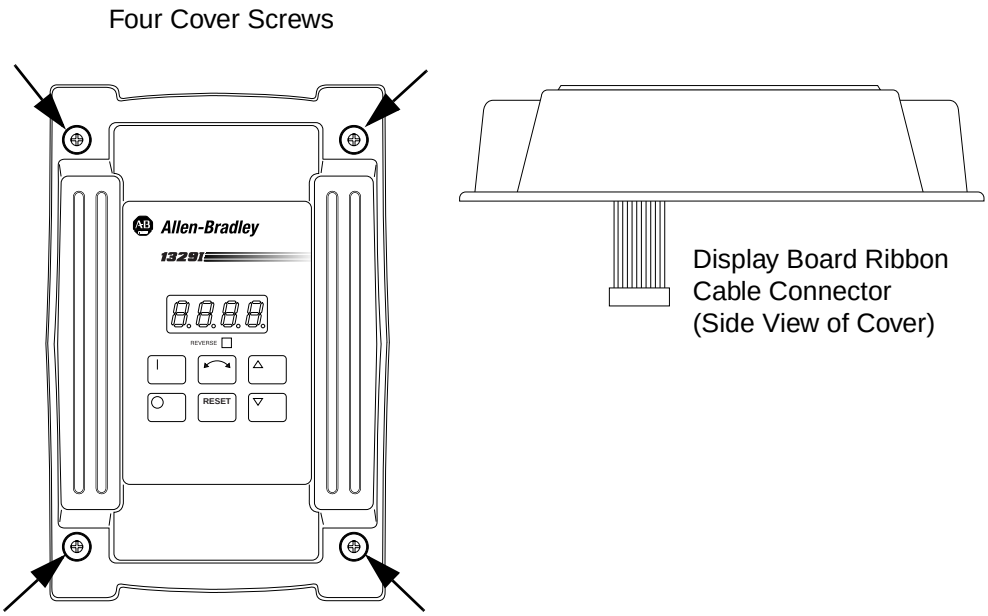
Observe the following guidelines when wiring AC power:

- The terminal block accepts up to 3.31 mm^2 (12 AWG) wire.
- The recommended tightening torque is 1.3 newton-meters (12 in-lb).
- Verify that the input power to the unit corresponds to the unit voltage and frequency and that the input supply is of sufficient capacity to support the input current requirements. Refer to Appendix A, Technical Specifications.
- Size the AC line conductors for the unit rating and in accordance with all applicable local, national, and international codes.

Use the following procedure to wire AC power to the unit. Grounding instructions are provided in Section 5.1.

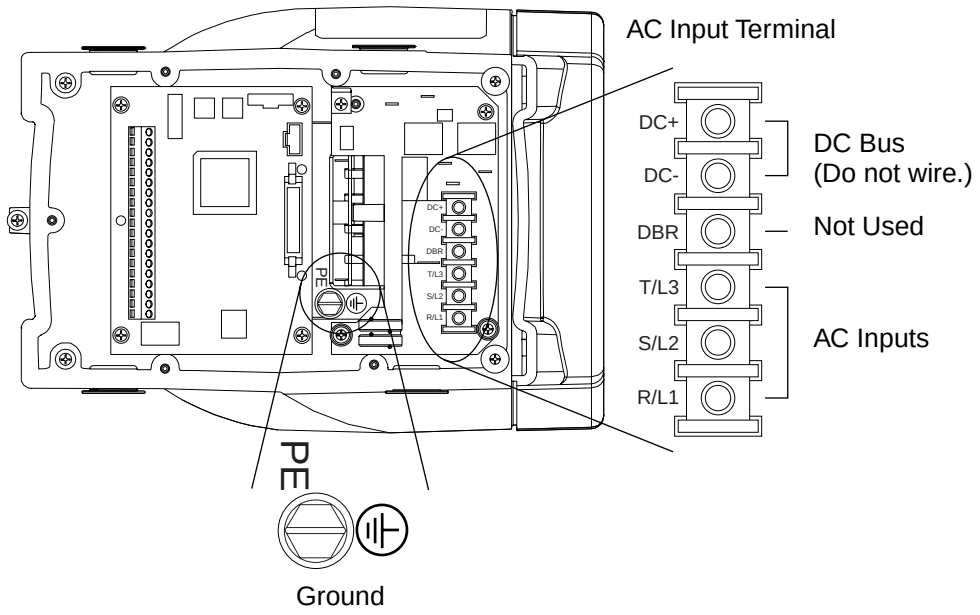
Remove the cover by loosening the four cover screws. Note that the display ribbon cable is designed to disconnect from the main unit when the cover is removed as shown in Figure 5.1.

Figure 5.1
Removing the Cover



Connect the incoming AC line to terminals R, S, and T, as shown in Figure 5.2.

Figure 5.2
Grounding the Unit



5.1 Grounding the Unit

ATTENTION: The user is responsible for conforming with all local, national, and international codes applicable to the grounding of this equipment. Failure to observe this precaution could result in severe bodily injury or loss of life.

Connect the ground wire brought in with the incoming AC power to the unit's grounding screw (see Figure 5.2). This grounding conductor must run unbroken from the unit to earth ground.

Step 6 - Install a Hardwired Stop

ATTENTION: The user must provide an external, hardwired stop circuit outside of the 1329I unit circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation may result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

Depending upon the requirements of the application, the 1329I unit can be set up to provide either a coast-to-rest (default) or a ramp-to-rest (user option) operational stop. The unit's Function Loss input provides an additional coast-to-rest operational stop.

In addition to the operational stop, the user must provide a hardwired stop external to the unit. The hardwired stop circuit must contain only hardwired electromechanical components. Operation of the hardwired stop must not depend on electronic logic (hardware or software) or on the communication of commands over an electronic network or link.

End of Chapter

Step 7 - Wire the Control Signal Terminal Block

The following sections describe how to wire the control signal terminal block shown in Figure 7.1.

Refer to either Figure 7.2 (standard units) or Figure 7.3 (local operator control units) before you begin wiring. These figures show typical wiring connections and the sections in this chapter where the signals are described in detail.

Note the following when wiring the terminal block:

- The terminal block is isolated from the input power.
- Route the control wires separately from the power wires.
- The terminal block accepts 0.326 mm^2 (22 AWG) through 3.31 mm^2 (12 AWG) wire.
- The maximum lead length is 300 meters (1000 ft).
- The maximum tightening torque is 0.8 Nm (7 in-lb).

Figure 7.1
Control Signal Terminal Block

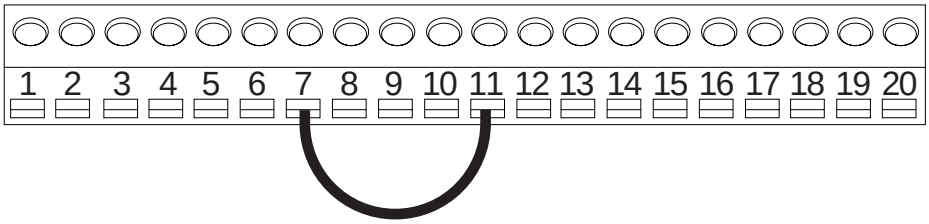


Table 7.1
Terminal Functions

Terminal Number	Terminal Function
1	10 Volt Reference
2	0 – 10 Volt Speed Reference Input
3	4 – 20 mA Speed Reference Input
4	Common
5	0 – 10 Volt Output
6	Common
7	24 Volt DC
8	Speed Preset 2
9	Speed Preset 1
10	Speed Preset 0
11	Function Loss
12	RPM/Percent Load Display
13	24 Volt DC
14	Forward/Reverse
15	Reset
16	Start
17	Stop
18	24 Volt DC Common
19	N.O. Relay
20	Relay Common

Figure 7.2
Typical Control Signal Connections for Standard Units

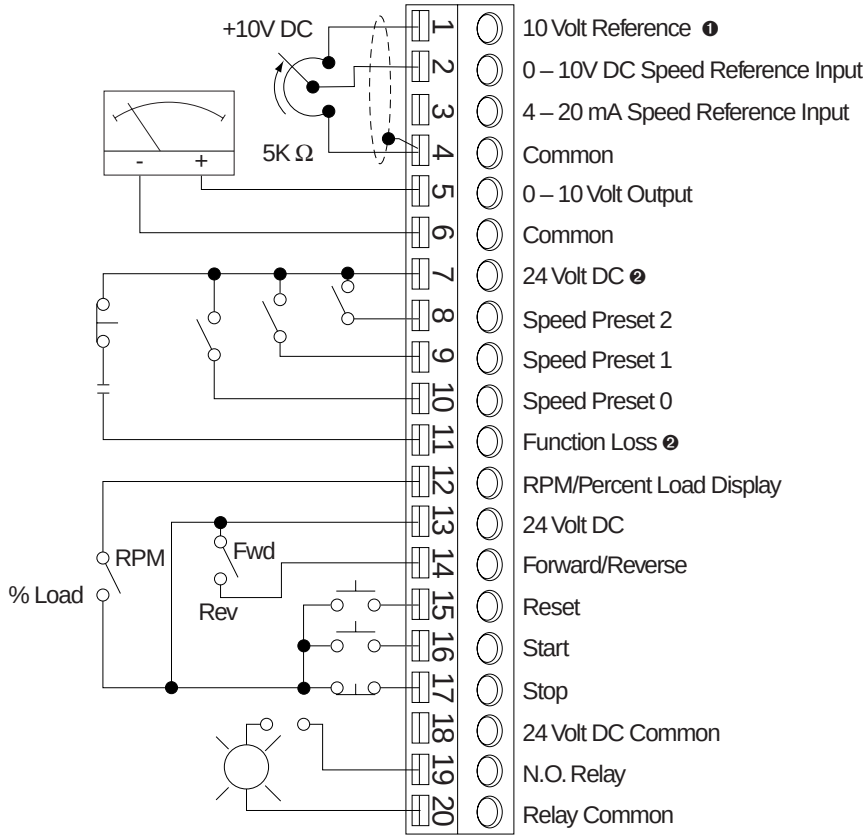


Table 7.2
User Wiring for Standard Units

Signal	Refer to Section
Function Loss	**7.1**
Analog Input	**7.2**
Relay Control Output	**7.3**
RPM/Percent Load Display	**7.4**
Speed Reference (select one)	
Preset Speed	**7.5.1**
Speed Potentiometer	**7.5.2**
External Speed Reference (0 – 10V DC or 4 – 20 mA)	**7.5.3**
Start	**7.6**
Stop	**7.6**
Forward/Reverse	**7.7**
Reset	**7.8**

❶ An external 0 to 10 volt DC or 4 to 20 mA speed reference source can be connected. See Section 7.5.3 for more information.

❷ The jumper between terminals 7 and 11 must be removed when wiring the Function Loss input. See Section 7.1 for more information.

Figure 7.3
Typical Control Signal Connections for Local Operator Control Units

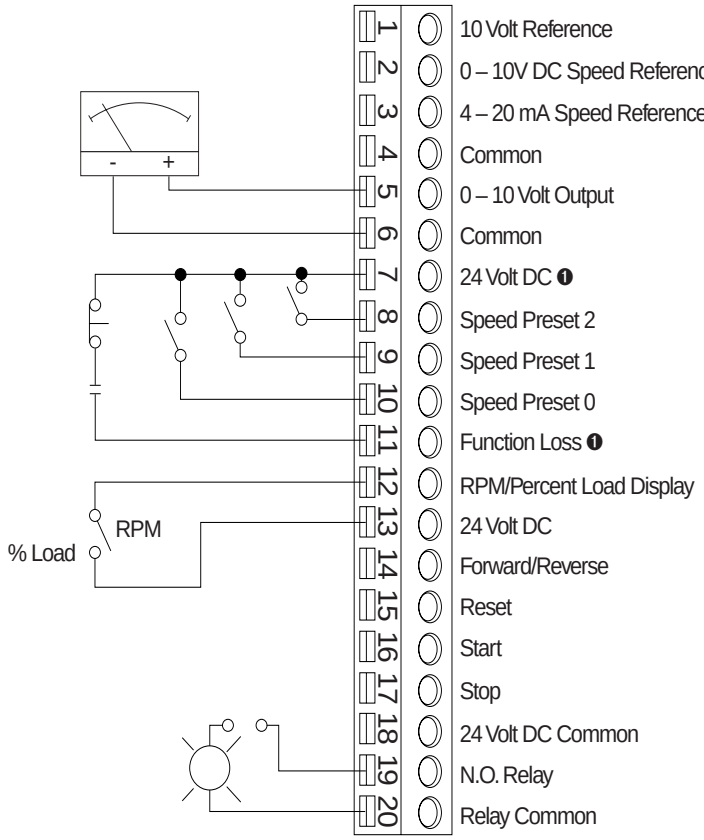


Table 7.3
User Wiring for Local Operator Control Units

Signal	Refer to Section
Function Loss	**7.1**
Analog Input	**7.2**
Relay Control Output	**7.3**
RPM/Percent Load Display	**7.4**
Speed Reference (select one)	
Preset Speed	**7.5.1**
Speed Potentiometer	**7.5.2**
External Speed Reference (0 – 10V DC or 4 – 20 mA)	**7.5.3**

❶ The jumper between terminals 7 and 11 must be removed when wiring the Function Loss input. See Section 7.1 for more information.

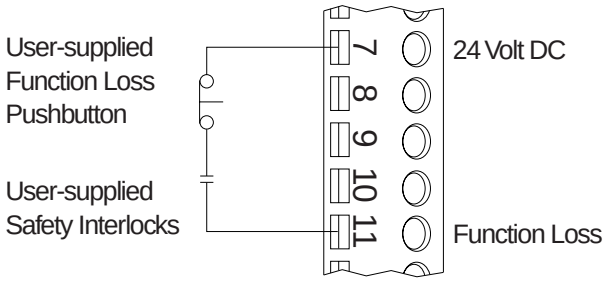
7.1 Wiring Function Loss

For the unit to run, you must maintain a signal at the Function Loss input (the connection between control terminals 7 and 11). If the Function Loss signal is not present, the unit turns off the power devices and coasts to rest. To restart the unit, you must restore the Function Loss signal, clear any faults, and reassert the Start command.

The unit ships from the factory with a jumper between terminals 7 and 11 which provides the Function Loss signal. The Function Loss input should be wired in series with the drive's external interlocks as shown in Figure 7.4. In this case, remove the jumper before making the connections.

Function Loss provides an operational stop. It does not fulfill the requirements of a hardwired stop. Refer to Chapter 6 for information regarding hardwired stop requirements.

Figure 7.4
Function Loss Control Wiring



7.2 Wiring the Analog Output

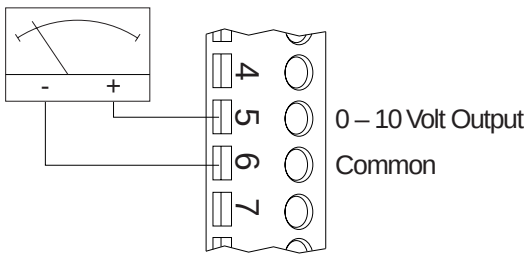
The analog output provides a 0 to 10 VDC signal to a user-supplied metering device. This output indicates speed (default) or percent load (user option), based on the status of input terminal 12.

If you select speed indication, 0 to 10 V = 0 to the maximum speed as defined by the maximum speed rotary switch. (Refer to Chapter 8 for a description of the rotary switch.)

If you select percent load indication, 0 to 10 V = 0 to 200percent load.

Wire to the analog output as shown in Figure 7.5.

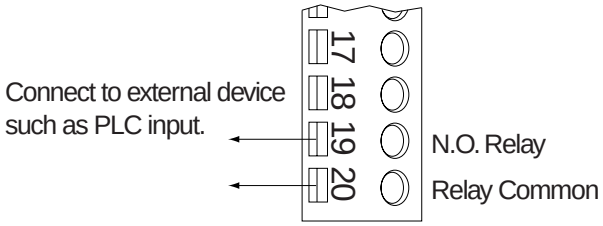
Figure 7.5
Analog Output Wiring



7.3 Wiring the Relay Control Output

A single form A relay on the terminal block can be used to indicate the unit is running (default) or has faulted (user option) based on the setup DIP switch setting. Refer to the setup DIP switch description in Chapter 8.

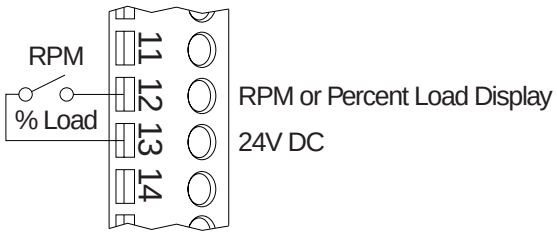
Figure 7.6
Relay Control Output Wiring



7.4 Wiring RPM or Percent Load Display

The RPM or Percent Load Display input (control terminal 12) selects the type of information displayed by the analog output and the built-in display, speed in RPM or percent load. Wire a switch between control terminals 12 and 13 as shown in Figure 7.7.

Figure 7.7
RPM or Percent Load Display Wiring



7.5 Wiring the Speed Reference

The **standard 1329I unit** provides two motor speed reference options:

- Seven preset speeds
- An external 0 to 10 VDC or 4 to 20 mA speed reference source

- The **1329I unit with local operator controls** provides three motor speed reference options:

- The local operator controls (using the ▵ ▿ keys)

- Seven preset speeds (the ▵ ▿ keys are not used)

- An external 0 to 10 VDC or 4 to 20 mA speed reference source (the ▵ ▿ keys are not used)

Select the option that is the most suitable for your application. The following sections provide wiring information for each option except the local operator controls. Refer to Section 1.2 for information on the local operator controls.

7.5.1 Wiring the Preset Speed Inputs

Control terminals 8, 9, and 10 select seven preset speeds as shown in Table 7.4. Note that if you select a preset speed that is greater than the maximum speed setting (based on the rotary switch setting), the unit uses the maximum speed setting value.

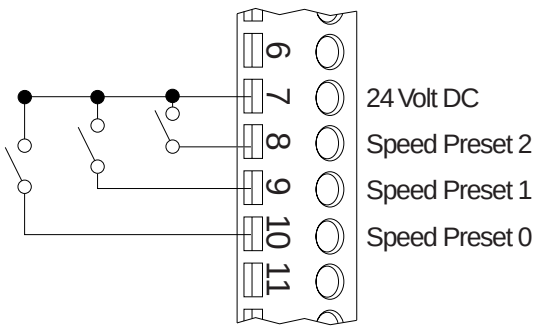
Important: DIP switch position 8 defines whether terminals 8, 9, and 10 are used as presets (default) or to define the unit's minimum speed (user option). Refer to Section 8.3.8 for information about using terminals 8, 9, and 10 to select minimum speed.

Table 7.4
Fixed Preset Speed Selections

Terminal 8 Status	Terminal 9 Status	Terminal 10 Status	Selected Speed Reference	
			Standard Unit	Local Operator Control Unit
Open	Open	Open	Analog speed reference	Local operator control
Open	Open	Closed	Preset 1 - 300 RPM (10 Hz)	
Open	Closed	Open	Preset 2 - 600 RPM (20 Hz)	
Open	Closed	Closed	Preset 3 - 900 RPM (30 Hz)	
Closed	Open	Open	Preset 4 - 1200 RPM (40 Hz)	
Closed	Open	Closed	Preset 5 - 1500 RPM (50 Hz)	
Closed	Closed	Open	Preset 6 - 1800 RPM (60 Hz)	
Closed	Closed	Closed	Preset 7 - 2100 RPM (70 Hz)	

To use the preset speeds to set the speed reference, wire to terminals 8, 9, and 10 as shown in Figure 7.8.

Figure 7.8
Preset Speed Input Wiring

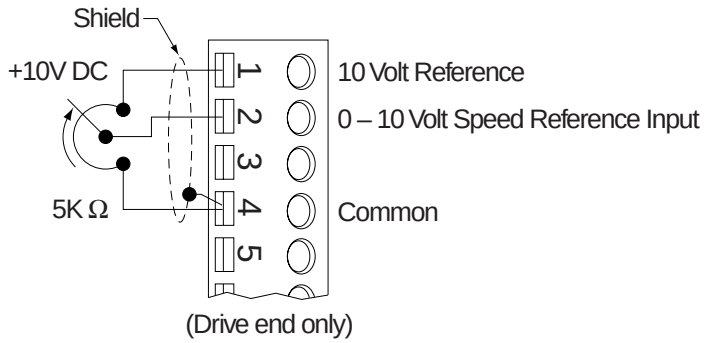


7.5.2 Wiring the Speed Reference Signal Potentiometer

Control terminal 1 provides a 10 VDC reference for use with the user-supplied 5 kΩ potentiometer. Perform the following procedure to wire the potentiometer as the speed reference (refer to Figure 7.9):

1. Mount the speed reference potentiometer at an appropriate operator-accessible location, less than 300 meters (1000 feet) from the 1329I unit.
2. Connect one end of the potentiometer to control terminal 1 (10V reference) and the other end to control terminal 4 (signal common).
3. Connect the potentiometer's wiper to control terminal 2 (speed reference input).

Figure 7.9
Speed Reference Potentiometer Wiring



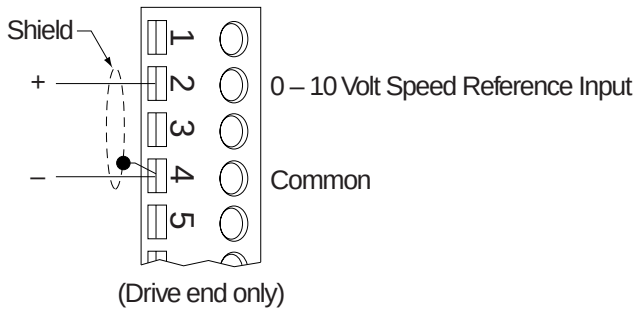
7.5.3 Wiring an External Speed Reference (0 to 10 VDC or 4 to 20 mA)

The terminal block provides both 0 to 10 VDC and 4 to 20 mA inputs. Use only one of these inputs for the external speed reference. The other input must remain unconnected.

0 to 10 VDC External Speed Reference

To use an external 0 to 10 VDC signal to set the speed reference, connect the signal leads as shown in Figure 7.10. 0 to 10 VDC = minimum speed to maximum speed

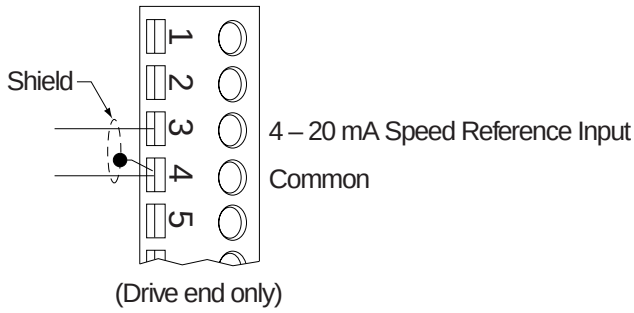
Figure 7.10
0 to 10 VDC External Speed Reference Wiring



4 to 20 mA External Speed Reference

To use an external 4 to 20 mA signal to set the speed reference, connect the signal leads as shown in Figure 7.11. 4 to 20 mA = 0 to maximum speed.

Figure 7.11
4 to 20 mA External Speed Reference Wiring



7.6 Wiring Start / Stop Control

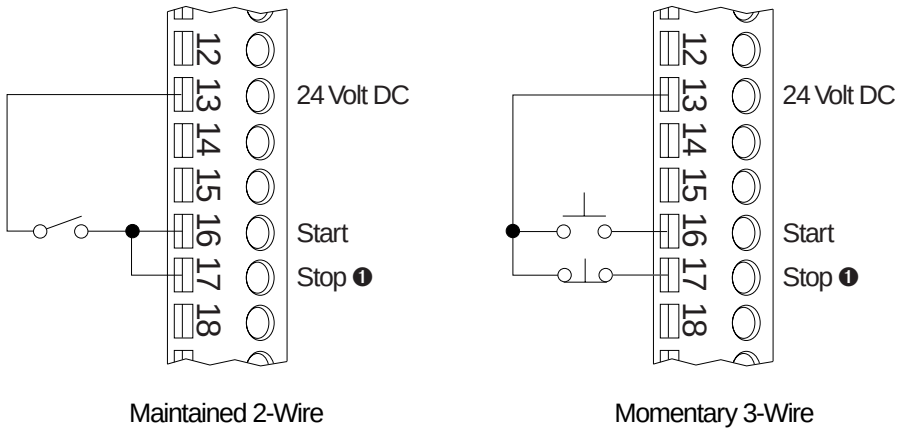
Important: This applies to standard units only.

The system looks for an open-to-closed transition at the Start input before starting the unit unless you have the Power-Up Start switch (setup DIP switch 1, see Section 8.3.1) set to ON. If you use a maintained start device and power to the unit is lost, you must open and reclose the start device before the unit will start again. Both the Stop and the Function Loss input signals must be present and there must be no active faults for the unit to start.

In order for the unit to run, you must maintain a signal at the Stop input. If the signal is interrupted, the unit coasts to rest (default) or ramps to rest (user option). To restart the unit, you must restore the signal and reassert the Start input.

Figure 7.12 illustrates wiring for a maintained 2-wire and for a momentary 3-wire Start / Stop control

Figure 7.12
Start / Stop Control Wiring



❶ Refer to Chapter 8 to select a stop method via SW3 Selector Switch.

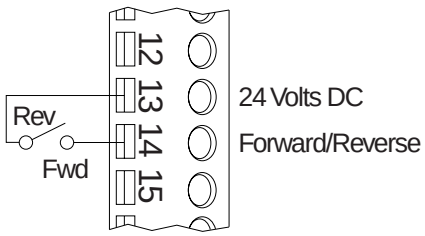
7.7 Wiring Forward / Reverse Control

Important: This applies to standard units only.

The Forward / Reverse input (the connection between terminals 13 and 14) defines the requested direction of motor rotation. If the input is open, the requested direction is forward. Switching the Forward / Reverse input causes the motor to ramp to rest and then accelerate in the opposite direction. Note that the 1329I unit is shipped with the forward direction defined as CCW shaft rotation as viewed from the motor shaft end.

Figure 7.13 shows the Forward / Reverse control wiring for the 1329I unit. If you disable (lock out) reverse using the setup DIP switch, do not wire to this input because the drive ignores any transition on this input. Refer to the setup DIP switch description in Chapter 8

Figure 7.13
Forward / Reverse Control Wiring



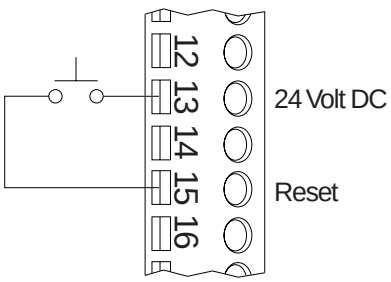
7.8 Wiring Reset Control

Important: This applies to standard units only.

An open-to-closed transition at the Reset input (control terminal 15) clears a fault once the appropriate corrective action has been taken. After clearing the fault, you must reassert the Start command in order to restart the unit.

Wire a normally-open (N.O.) push-button between control terminals 15 and 13 as shown in Figure 7.14. Refer to Chapter 11, Diagnostics and Troubleshooting, for more information on faults.

Figure 7.14
Reset Control Wiring



Step 8 - Verify the Setup and Adjust Switches if Required

The 1329I unit is set up using two rotary switches and a 10-position DIP switch mounted on the printed circuit board as shown in Figure 8.1. Figure 8.1 shows the setting selections and the factory defaults. Normally, no adjustments will be needed to the factory settings.

If your application requires adjustment to these settings, refer to the following sections in this chapter. If no adjustment is needed, go to Chapter 9 to complete the installation procedure.

ATTENTION: Only qualified personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this instruction manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: All adjustments to these components should be made with power removed. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: After disconnecting input power wait five minutes and check with a voltmeter to assure that DC bus capacitors are discharged. The voltmeter should read zero volts. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The cover screws must be securely tightened in order to properly ground the cover. Verify that all four cover screws are tight before applying power to the unit. Failure to observe this precaution could result in severe bodily injury or loss of life.

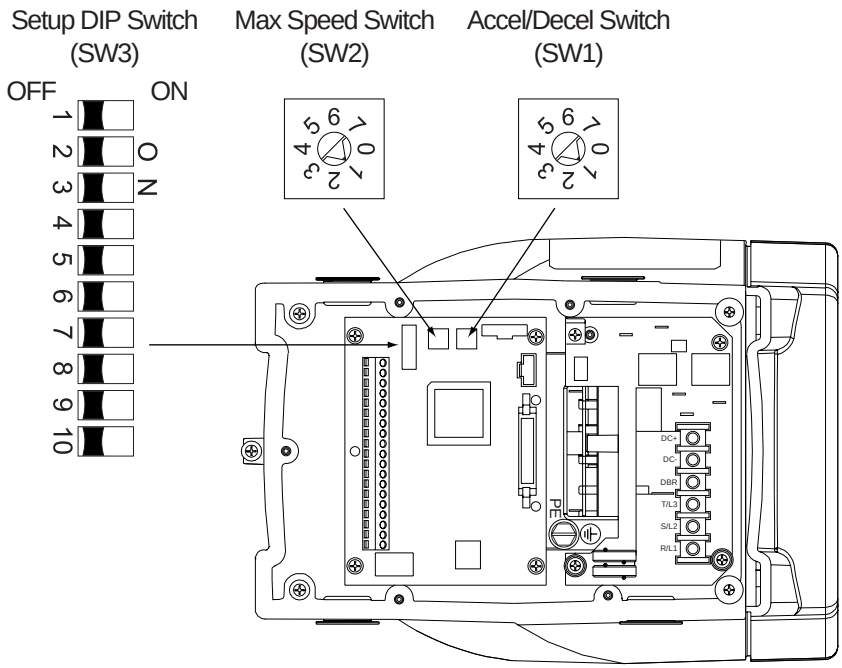
Review all setup instructions thoroughly before making any adjustments or applying power to the unit.

After changing the setup, go to Chapter 9 to complete the installation.

Before making any adjustments to the unit, be sure to take the following precautions:

1. Turn off, lockout, and tag AC input power to the unit.
2. Wait five minutes. Then remove the cover and use a voltmeter to verify that the DC bus capacitors are discharged. The voltmeter should read zero volts. Refer to Figure 5.2 for the DC bus test points.

Figure 8.1
Rotary Switches and Setup DIP Switch Locations

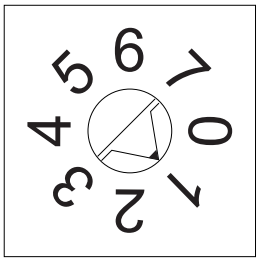


8.1 Adjusting the Maximum Speed

ATTENTION: The user is responsible for ensuring that driven machinery and all drive-train mechanisms are capable of safe operation at maximum speed. Failure to observe this precaution could result in severe bodily injury or loss of life.

The maximum speed rotary switch limits the speed reference to the unit. Regardless of what speed reference is supplied, the unit will not command a speed greater than value selected by this rotary switch.

Figure 8.2
Maximum Speed Rotary Switch Settings



0 = 1500 RPM (50 Hz)
1 = 1800 RPM (60 Hz) Default
2 = 2100 RPM (70 Hz)
3 = 2400 RPM (80 Hz)
4 = 2700 RPM (90 Hz)
5 = 3000 RPM (100 Hz)
6 = 3300 RPM (110 Hz)
7 = 3600 RPM (120 Hz)

Range: 1500 RPM (50 Hz) to 3600 RPM (120 Hz)

Default: 1800 RPM (60 Hz)

To set the maximum speed:

1. To **increase** the maximum speed, turn the maximum speed rotary switch to a higher position number.

   -or-

   To **decrease** the maximum speed, turn the maximum speed rotary switch to a lower position number.

2. Connect the display board ribbon cable and replace the cover. Verify that all four cover screws are in place and tightened.

3. Apply AC input power.

4. Set the operator's speed reference signal to maximum.

Standard units: Use the speed potentiometer or other user-supplied external speed reference device.

Local operator control units: Use the [▵] key to increase the speed reference and the [▿] key to decrease the speed reference.

5. Use a hand held tachometer to monitor motor speed.

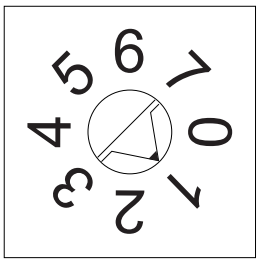
6. Repeat the adjustment procedure until the desired maximum speed is obtained. Note that changes to the maximum speed setting are recognized only while the drive is stopped.

Important: If speed is erratic or not as expected, verify that only one of the speed reference inputs (0 to 10 VDC or 4 to 20 mA) has been wired.

8.2 Adjusting the Acceleration / Deceleration Time

The acceleration / deceleration time is the amount of time it takes the motor to ramp from stop to the maximum speed setting of the unit. This is also the amount of time it takes the motor to ramp from the maximum speed setting to stop. For all settings except Setting 0, Acceleration time is equal to Deceleration time.

Figure 8.3
Acceleration/Deceleration Rotary Switch



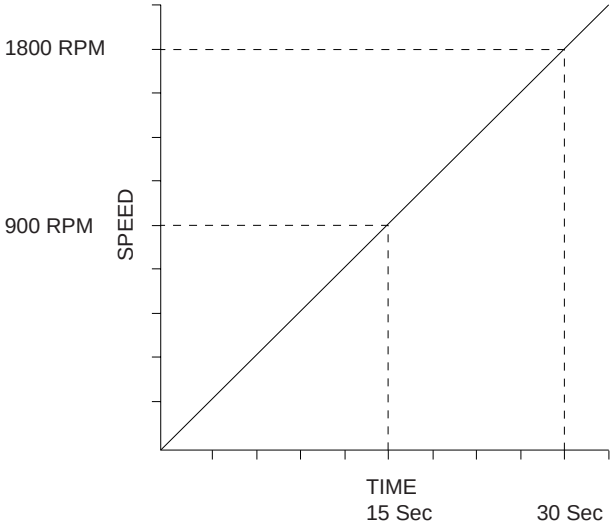
0 = 1 Second Accel/5 Sec Decel
1 = 5 Seconds (Default)
2 = 10 Seconds
3 = 15 Seconds
4 = 20 Seconds
5 = 30 Seconds
6 = 60 Seconds

Range: 1, 5, 10, 15, 20, 30, 60, 90 seconds

Default: 5 seconds

Note that if the operator speed reference setting is less than the maximum speed value, the acceleration / deceleration ramp time is proportionately less than the acceleration / deceleration setting.

Example



Assume:
Max Speed = 1800 RPM
Operating Speed = 900 RPM
Accel/Decel Time Setting = 30 Seconds

Use this formula:

$$\frac{\text{Operating Speed}}{\text{Max Speed}} \times \text{Accel/Decel Time Setting} = \text{Time to Operating Speed}$$

$$\frac{900}{1800} \times 30 = 15$$

It will take 15 seconds to ramp from stop to 900 RPM.

To adjust the acceleration / deceleration time:

1. To **increase** the acceleration / deceleration time, turn the accel / decel rotary switch to a higher position number.

   -or-

   To **decrease** the acceleration / deceleration time, turn the accel / decel rotary switch to a lower position number.

2. Connect the display board ribbon cable and replace the cover. Verify that all four cover screws are in place and tightened.
3. Apply AC input power.
4. Set the desired operating speed.
5. **Standard units:** Use the speed potentiometer or other user-supplied external speed reference device.
6. **Local operator control units:** Use the [△] key to increase the speed reference and the [▽] key to decrease the speed reference.
7. Repeat the adjustment procedure until the desired acceleration / deceleration time is obtained. Note that changes to the acceleration / deceleration time are recognized only while the drive is stopped.

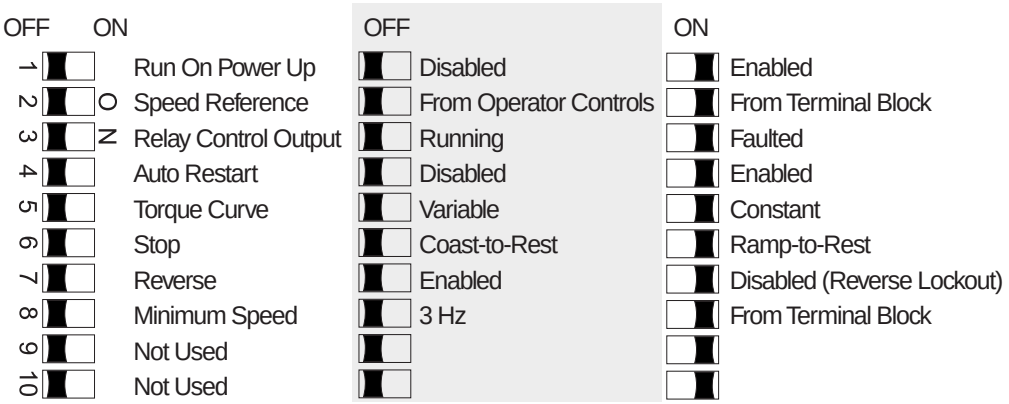
Important: If speed is erratic or not as expected, verify that only one of the speed reference inputs (0 to 10 VDC or 4 to mA) has been wired.

8.3 Modifying the Setup Using the Setup DIP Switch

The switches in the 10-position setup DIP switch define the characteristics of the 1329I unit as shown in Figure 8.4. The switches are preset at the factory to suit a wide range of applications and normally do not need to be changed. The following sections describe how to modify the setup to suit your specific application, if required.

Important: Changes to the DIP switch settings are recognized only while the drive is stopped.

Figure 8.4
Setup DIP Switch Selections



8.3.1 Run On Power Up (Position 1)

On Standard Units only, enabling this feature causes output power to be applied to the Motor Section automatically at drive power up.

ATTENTION: When this feature is enabled, the drive may start at any moment. This feature may only be used as outlined in NFPA79, Under Voltage Protection for specialized applications. Equipment damage and/or personal injury or loss of life may result if this feature is used in an inappropriate application.

Important: If AC power is lost, the drive will restart if the Standard Unit is wired for 2-wire control.

The switch at position 1 enables or disables the run on power up function. When this function is enabled, output power is applied to the Motor Section automatically at power up if all run on power up permissive conditions are met. These conditions are:

- No faults are active.
- The terminal strip function loss input is closed.
- **On standard units:** In addition to the start permissive conditions listed above, the terminal strip Start and Stop inputs must be closed.
- **On local operator control units:** The unit will simulate a start signal edge; you do not have to press the green [I] key.

Settings (Position 1):

OFF position = Run On Power Up Disabled (Default)
ON position = Run On Power Up Enabled

8.3.2 Speed Reference Select (Position 2)

Important: This applies only to local operator control units.

The switch at position 2 is used to select whether the unit gets its speed reference from the operator controls or from the analog input terminals. If this switch is set to the OFF position, the speed reference will come from the operator controls. If this switch is set to the ON position, the speed reference will come from the analog input terminals, and the [△] and [▽] keys are not functional.

Settings (Position 2):

OFF position = Speed Reference from Operator Controls (Default)
ON position = Speed Reference from Analog Input Terminals

8.3.3 Relay Control Output - Running or Faulted (Position 3)

The switch at position 3 specifies the type of status indication provided by the normally open (N.O.) relay control output (control terminals 19 and 20). See Section 7.3 for a description of control terminals 19 and 20. The relay can be used to indicate that the unit is running (power is applied to the Motor Section) or has faulted (an active drive fault exists).

Switch 3 Position	State of Unit	Relay Control Output Status
OFF (Unit running indication selected)	Running	Closed
	Stopped	Open
ON (Unit faulted indication selected)	No Faults	Closed
	Active Fault	Open

Settings (Position 3):

OFF position = Unit Running Indication (Default)
ON position = Unit Faulted Indication

8.3.4 Auto Restart (Position 4)

ATTENTION: When this feature is enabled, the Drive Section will restart automatically after an auto-restartable fault occurs (see Table 8.1). This feature may only be used as outlined in NFPA79, Under Voltage Protection for specialized applications. Equipment damage and/or personal injury or loss of life may result if this feature is used in an inappropriate application. An auto-restart can be canceled by pressing the RESET key or remote Reset device.

The switch at position 4 enables or disables the auto-restart function. If the auto-restart function is enabled, the unit shuts down as usual upon the detection of a fault, waits five seconds, and attempts to start automatically. If the fault reoccurs, the Drive Section again waits five seconds before trying to start, up to a maximum of four attempts within a five minute period. If the Drive Section fails all these attempts, it remains in the faulted state and displays the fault it is attempting to clear.

Auto Restart Countdown

As a precaution, the drive will visually count down for 5 seconds prior to an auto restart attempt. The following character groups are displayed in sequence to indicate that the countdown is in progress.

Ar05 ... Ar04 ... Ar03 ... Ar02 ... Ar01

Table 8.1
Auto-Restarable Faults

Fault Code	Description
F.OC	Overcurrent
F.OL	Overload
F.HU	High bus voltage
F.LU	Low bus voltage
F.OH	Overtemperature

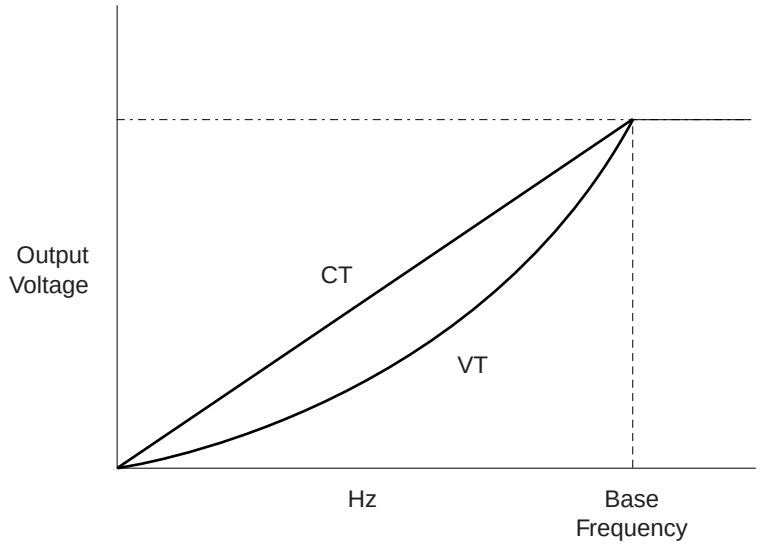
Settings (Position 4):

OFF position = Auto-Restart Disabled (Default)
ON position = Auto-Restart Enabled

8.3.5 Torque Curve (Position 5)

The switch at position 5 selects either a variable torque curve or a constant torque curve. The variable torque selection provides a squared V/Hz curve and 110% electronic thermal overload and 110% current limit for one minute. The constant torque selection provides a linear V/Hz curve and 150% electronic thermal overload and 150% current limit for one minute.

Figure 8.5
Torque Curve



Settings (Position 5):

OFF position = Variable Torque Curve (Default)
ON position = Constant Torque Curve

8.3.6 Stop Type (Position 6)

The switch at position 6 selects how the motor will stop when the Stop input is asserted (or the red ○ key is pressed). A coast-to-rest stop turns off the transistor power device drivers. A ramp-to-rest stop continues to switch the transistor power device drivers until the output frequency equals 0 Hz (decelerating the motor at a rate based on the accel / decel switch setting), and then turns off the power device drivers.

Settings (Position 6):

OFF position = Coast-to-Rest (Default)
ON position = Ramp-to-Rest

8.3.7 Reverse Disable (Position 7)

The switch at position 7 enables or disables reverse rotation of the motor. It is factory-set to enable a forward-to-reverse change of motor direction. If this switch is in the ON position, the reverse direction is disabled (locked out). In other words, the motor can run in the forward direction only.

Settings (Position 7):

OFF position = Reverse Enabled (Forward/reverse change allowed; default)
ON position = Reverse Disabled (Reverse direction prohibited)

8.3.8 Minimum Speed Select (Position 8)

The switch at position 8 is used to select whether the minimum speed will be 90 RPM (3 Hz) or will be determined by the preset inputs (terminals 8, 9, and 10 on the control terminal block).

Important: DIP switch position 8 defines whether terminals 8, 9, and 10 are used as presets (default) or to define the unit's minimum speed (user option). If you select the ON position (Minimum Speed from the Control Signal Terminal Block), you cannot use the speed reference presets. See Section 7.5.1 for information about the preset speed inputs.

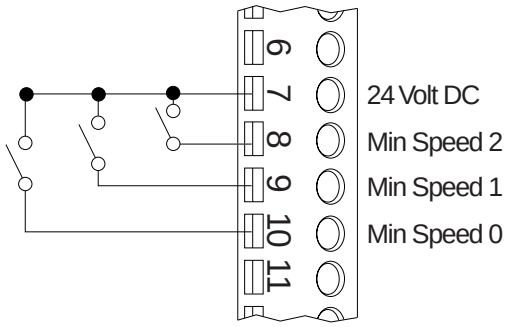
Settings (Position 8):

OFF position = 90 RPM (3 Hz) Minimum Speed (Default)
ON position = Minimum Speed from the Control Terminal Block

When the switch in position 8 is ON, the minimum speed will be determined as shown in the following table:

Control Terminal Block			DIP Switch Position 8 = ON
Terminal 8 Status	Terminal 9 Status	Terminal 10 Status	Minimum Speed Setting
Open	Open	Open	90 RPM (3 Hz)
Open	Open	Closed	150 RPM (5 Hz)
Open	Closed	Open	300 RPM (10 Hz)
Open	Closed	Closed	600 RPM (20 Hz)
Closed	Open	Open	900 RPM (30 Hz)
Closed	Open	Closed	1200 RPM (40 Hz)
Closed	Closed	Open	1500 RPM (50 Hz)
Closed	Closed	Closed	1800 RPM (60 Hz)

Figure 8.6
Wiring Minimum Speed



Step 9 - Check the Installation

ATTENTION: Only qualified electrical personnel, familiar with the construction and operation of this equipment and the hazards involved, should install, adjust, operate, and/or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe these precautions could result in severe bodily injury or loss of life.

To ensure safe operation, check the installation with the power off before operating the unit. When power is first applied, the direction of rotation, operator speed reference, and operation under load should be tested.

9.1 Checking the Installation with the Power Off

ATTENTION: After disconnecting input power wait five minutes and check with a voltmeter to assure that DC bus capacitors are discharged (DC+, DC-). The voltmeter should read zero volts. Failure to observe these precautions could result in severe bodily injury or loss of life.

Perform the following checks of the unit installation with the power off:

1. Turn off, lockout, and tag AC input power to the unit.
2. If an input disconnect is installed, make sure it is in the OFF position.
3. Wait five minutes after disconnecting power and verify that the DC bus has discharged to zero volts. See Figure 5.2 for the test points used to measure DC bus voltage.
4. Check that any interlocks installed around the driven machine are operational.
5. Check that there is adequate clearance around the unit. Refer to Figure 2.2.
6. Check that the wiring to the control signal terminal strip and to the power terminals is correct (Figures 5.2 and 7.1 through 7.14).
7. Check that the setup DIP switches and the rotary switches are set correctly.
8. Check that user-supplied branch circuit protection is properly installed and correctly rated.
9. Check that incoming AC power is correctly rated.
10. Check that the rating of the transformer (if used) matches the unit requirements and that the transformer is connected for the proper voltage.
11. Check that a properly sized ground wire is installed and that a suitable earth ground is used. Verify that all ground leads are run unbroken.

9.2 Checking the Direction of Motor Rotation

The 1329I unit is shipped with the forward direction defined as counterclockwise (CCW) shaft rotation as viewed from the motor shaft end. If this is appropriate for your application, go to Section 9.3, Attaching the Cover.

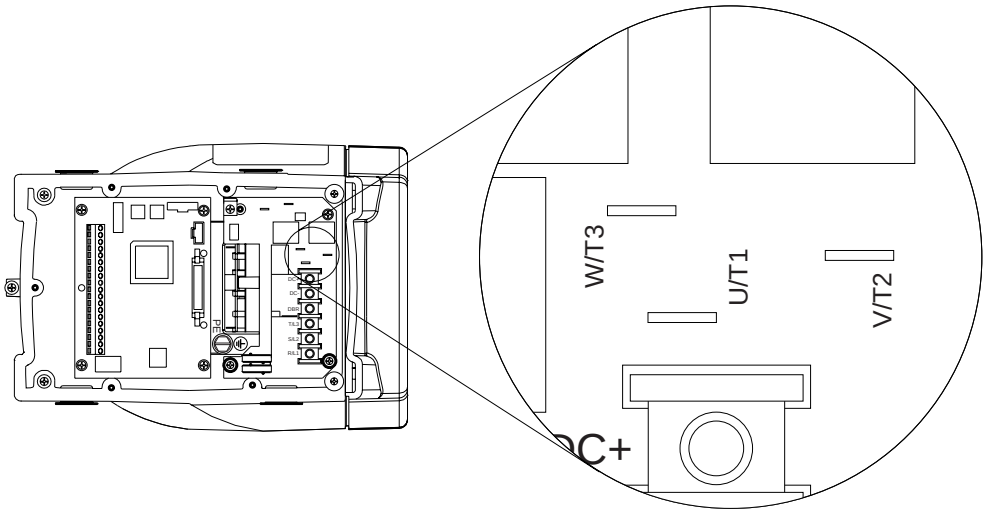
If this is not appropriate for your application, do one of the following:

Change the direction by using the Forward / Reverse input to select the appropriate direction.

-or-

Change the definition of forward and reverse by swapping the U/T1 and W/T3 connectors as shown in Figure 9.1.

Figure 9.1
Changing the Definition of Forward and Reverse



9.3 Attaching the Cover

ATTENTION: The cover screws must be securely tightened in order to properly ground the cover. Verify that all four cover screws are tight before applying power to the unit. Failure to observe this precaution could result in severe bodily injury or loss of life.

The cover can be rotated 180° to allow the display and local operator controls to be in the correct orientation regardless of the mounting position. Before attaching the cover, determine the proper cover orientation. If the cover must be rotated, follow the procedure in Section 9.3.1.

Before reattaching the cover, be sure the display board ribbon cable is securely connected, then position the cover and tighten the screws. The tightening torque limit for the cover screws is 1.3 - 1.7 Nm (11 - 15 in-lb). Verify that all four screws are securely tightened before applying power.

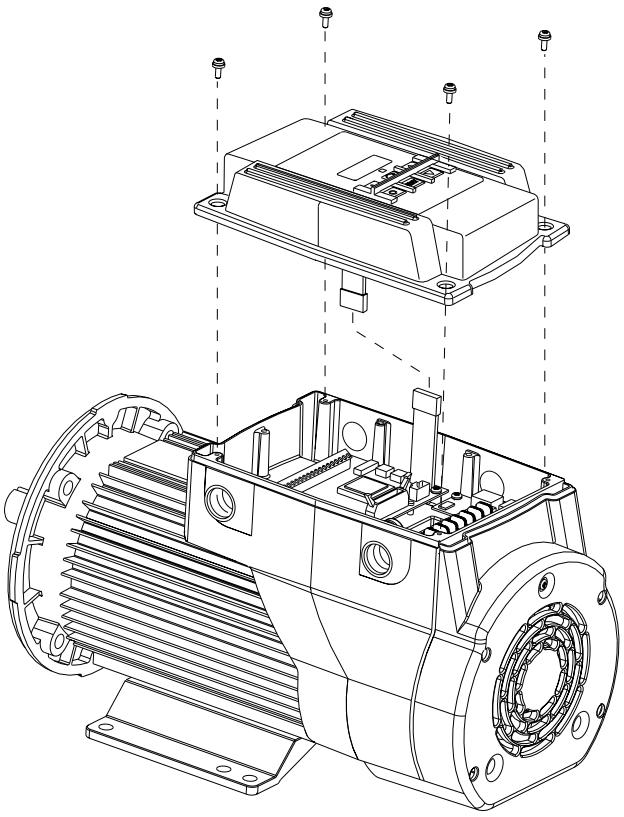
9.3.1 Rotating the Cover

Before rotating the cover, take the following precautions:

1. Turn off, lockout, and tag AC input power to the drive.
2. Remove the cover by loosening the four cover screws. Note that the display board ribbon cable is designed to disconnect when the cover is removed.
3. Wait five minutes after disconnecting power and verify that DC bus voltage is zero. See Figure 5.1 for the location of the DC bus test points.
4. Refer to Figure 9.2 and use the following procedure to rotate the cover:
5. Remove the display board ribbon cable from the display board. You will need to insert a small screwdriver into the cable latch to release it from the board.
6. Insert the display board ribbon cable into the opposite side of the display board. Push the cable in until it clicks. Verify the connection by lightly tugging on the cable.
7. Rotate the cover.
8. Connect the display board ribbon cable together.

Position the cover and tighten the four cover screws. The tightening torque limit for the cover screws is 1.3 - 1.7 Nm (11 - 15 in-lb). Verify that all four screws are securely tightened before applying power.

Figure 9.2
Rotating the Cover



9.4 Checking the Speed Reference

ATTENTION: The following procedures require rotating parts and/or electrical circuits to be exposed. Stay clear if the unit must be running. Disconnect, lockout, and tag the power source if contact must be made. Failure to observe these precautions could result in severe bodily injury or loss of life.

Use the following procedure to check the speed reference:

1. Uncouple the driven equipment from the Motor Section, if possible.
2. Turn power on to the unit.
3. Set the operator speed reference signal to zero. Note that when the unit is powered up the first time, it uses the factory-set minimum speed setting as the speed reference.
4. **Standard units:** Use the speed potentiometer or other user-supplied external speed reference device.
5. **Local operator control units:** Use the ▽ key to decrease the speed reference.
6. Press the user-installed Start button (Section 7.6) or the green I key on local operator control units.
7. Vary the speed reference while running the motor unloaded across the speed range. Use a handheld tachometer to check the speed.
8. If the motor operates satisfactorily, proceed to Step 10.
   If the motor does not operate satisfactorily, continue with Step 9.
9. If the motor does not operate satisfactorily:
   a. Check that the speed reference is wired correctly. See Section 7.5, Wiring the Speed Reference.
   b. If the speed reference is correct, and the motor does not operate satisfactorily, refer to Chapter 8, Verify the Setup and Adjust the Switches if Required.
10. If the motor operates satisfactorily:
    a. Press the user-installed Stop button (Section 7.6) on standard units or the red O key on the local operator control units.
    b. Remove power from the unit.
    c. Couple the driven equipment to the Motor Section.

Step 10 - Set the Operating Speed

Before starting the unit, set the operating speed as follows:

Standard units: Use the speed potentiometer or other user-supplied external speed reference device.

Local operator control units: As shipped from the factory, the unit receives its speed reference from the keypad. Use the [△] key to increase the speed reference and the [▽] key to decrease the speed reference.

To use the analog input terminals for the speed reference, setup switch 2 (Speed Reference Select) must be in the ON position. In this case, the [△] [▽] keys are not used. Refer to Section 8.3.2 for more information.

Important: At subsequent power ups, the unit will use the last speed reference setting selected before power was removed.

End of Chapter

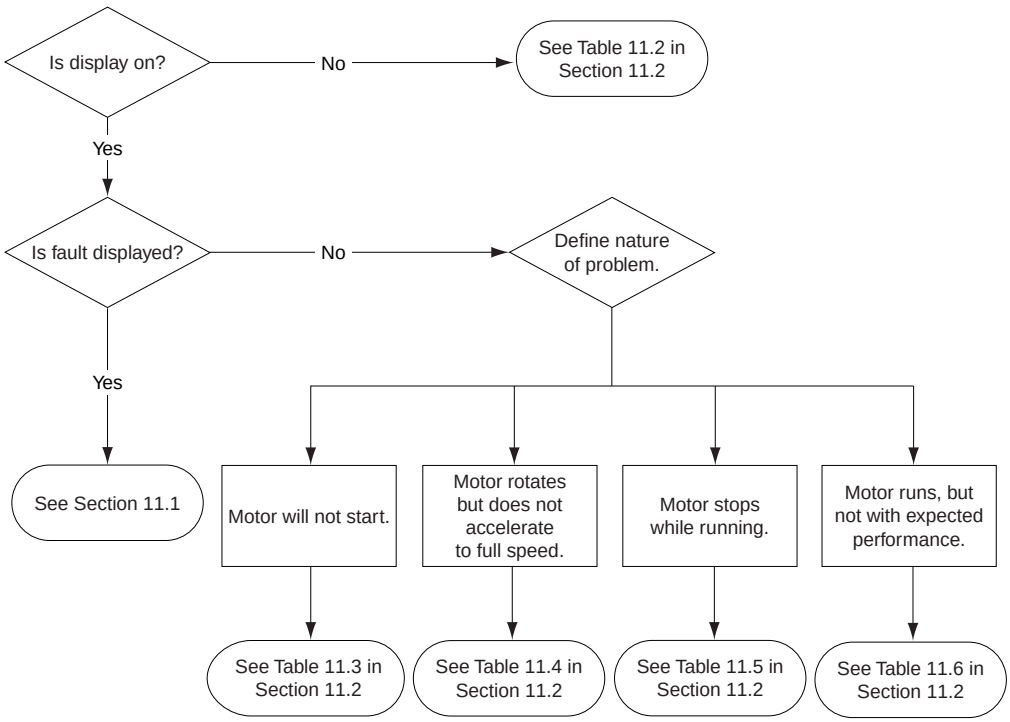
Diagnostics and Troubleshooting

ATTENTION: Only qualified personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this instruction manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: After disconnecting input power, wait five minutes and check with a voltmeter to assure that DC bus capacitors are discharged. The voltmeter should read zero volts. Failure to observe these precautions could result in severe bodily injury or loss of life.

ATTENTION: If a megohmmeter (megger) is used, make certain that all leads are disconnected between the motor and the drive. This will prevent damage to electronic circuitry due to high voltage generated by the megger. Use three wires to megger to ground. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following flowchart to troubleshoot the unit.



Observe the following precautions when troubleshooting the unit:

- Stop the unit using either the Stop input or Function Loss input.
- Disconnect, tag, and lockout AC power before working on the unit.
- Verify that there is no voltage present at AC input terminals R/L1, S/L2, and T/L3. Refer to Figure 5.2 for the location of the terminals.
- Wait five minutes and verify that the DC bus has discharged to zero volts. See Figure 5.2 for the location of the DC bus test points.

11.1 Fault Codes and Corrective Actions

The following table describes normal operational faults that may be corrected by the user. For standard units, the corrective action assumes that a Reset pushbutton is wired between control terminals 15 and 13, as described in Section 7.8.

If a fault occurs, do the following:

1. Try to clear the fault first by pressing the Reset pushbutton (or RESET key on local operator control units). If the fault reoccurs, continue with Step 2.
2. Refer to Table 11.1 to identify the fault code and the possible causes.
3. Perform the corrective action(s).
4. Clear the fault by pressing the Reset pushbutton (or RESET key).

Table 11.1
Fault Codes and Corrective Actions

Code	Fault Description	Fault Cause	Corrective Action
F.dcn or F.ddP	Keypad Cable Disconnected	Keypad cable disconnected while unit under power.	Turn off power to the unit. Verify the keypad cable connection. Turn power on to the unit.
F.drc	Keypad Cable Connected	Keypad cable connected while unit under power.	Turn off power to the unit. Verify the keypad cable connection. Turn power on to the unit.
F.FL	Function Loss	Open connection on Function Loss control terminal block inputs (terminals 7 and 11).	Check and restore the Function Loss connection on the control terminal block (see Section 7.1). Check the external sensors wired into the Function Loss string.
F.HU	High Bus Voltage	High input line. Deceleration time too fast. Overhauling load.	Check input line to verify voltage is within operating specifications. Increase deceleration time using the accel/decel rotary switch (see Section 8.2).

Code	Fault Description	Fault Cause	Corrective Action
F.LU	Low Bus Voltage	Low input line Temporary loss of input line.	Check input line to verify voltage is within operating specifications.
F.OC	Overcurrent (Current exceeded 200% of rated current.)	Shaft rotation blocked. Excessive driven load. Input power is not correctly wired to the unit. Motor Section ground fault.	Check for obstructions to shaft rotation. Reduce excessive load. Increase accel / decel time using the accel/decel rotary switch (see Section 8.2). Verify input wiring is correctly connected (see Section 5.0). Ohm out Motor Section to check for ground fault. Replace unit if a ground fault is detected.
F.OH	Unit Overtemperature	Operating environment is too hot. Blower is blocked or not operating. Excessive driven load.	Check the application site and verify the ambient temperature is within the operating specification. Check for blower obstruction. Replace blower if required. Reduce load or make sure unit matches the application requirement.
F.OL	Electronic Thermal Overload The electronic thermal overload will trip when the current to the motor has exceeded either 110% (variable torque V/Hz curve selected) or 150% (constant torque V/Hz curve selected) of the motor rated current for 60 seconds.	Excessive current to the motor for an extended time due to excessive load or short circuit.	Check for obstructions to shaft rotation. Reduce the driven load. Verify input wiring is correctly connected (see Section 5.0). Check for blower obstruction. Replace blower if required.
=NNN	Internal Fault (NNN = a number from 0 to 999) The display flashes the fault code on and off at 1/2 second intervals to indicate an internal fault.	Control board failure.	Replace Control board. Internal faults cannot be reset.

11.2 Troubleshooting Tables

Use the following tables to troubleshoot the unit. If you cannot resolve the problem using these tables, systematically replace the Drive Section and the Motor Section one at a time with a corresponding Drive Section or motor known to be operating correctly. If the problem is not corrected, contact Allen-Bradley distributor.

Table 11.2
Display Not On

Possible Cause	Corrective Action
Unit is not receiving input power.	Check input power wiring and connections (see Section 5.0). Check main power supply.
Display ribbon cable is not connected securely.	Open the cover and verify the cable connection by lightly tugging on the cable at each end. If the cable is disconnected, push the cable in until it clicks.

Table 11.3
Motor Will Not Start

Possible Cause	Corrective Action
Drive Section has faulted.	See Section 11.1.
Unit is not receiving input power.	Check input power wiring and connections (see Section 5.0). Check main power supply.
Start input is not asserted.	Check terminal board wiring. Assert Start input on standard unit (see Section 7.6) or press green [I] key on local operator control unit.
Function Loss input wiring is missing or incorrectly wired.	Check Function Loss wiring (see Section 7.1).
Stop input is open.	Close Stop input.
Faults have not been cleared. Fault code is displayed.	Assuming fault situation has been corrected, clear the faults by pressing the Reset pushbutton (wired between control terminals 13 and 15, see Section 7.8) on standard units or pressing the [RESET] key on local operator control units.

Table 11.4
Motor Rotates but Does Not Accelerate to Full Speed

Possible Cause	Corrective Action
Maximum speed is set too low.	Increase maximum speed by turning the maximum speed rotary switch to a higher position (see Section 8.1).
Unit is receiving incorrect speed reference.	Verify speed reference wiring (see Section 7.5).
Excessive load	Reduce load; make sure the unit matches the application requirement.

Table 11.5
Motor Stops While Running

Possible Cause	Corrective Action
Drive Section has faulted.	See Section 11.1.

Table 11.6
Motor Runs, But Not with Expected Performance

Symptom	Corrective Action
Motor accelerates too slowly.	Check accel / decel switch setting (see Section 8.2). Verify applied voltage. Verify input wiring. Reduce load.
Motor accelerates too quickly.	Check accel / decel switch setting (see Section 8.2).
Motor acceleration / deceleration is not smooth	Check the motor coupling to load.
Motor stops too slowly or too quickly.	Check Stop Type slide switch selection (see Section 8.3.6). Check accel / decel switch setting (see Section 8.2)
Blower does not operate.	Check wiring. Verify that blower can rotate freely. Verify that AC input voltage is correct. Replace blower.
High amps; %load indicates > 100%	Verify load is not excessive. Verify input line voltages.
Runs hot	Clean unit. Check input power connections (see Section 5.0). Check input power phases. Check input fuses. Check power supply (24V DC). Check blower.
Noisy	Check bearings; replace if necessary. Check unit mounting (alignment, etc.).
Runs in wrong direction	Refer to Section 9.3 (Checking the Direction of Motor Rotation).
Erratic speed	Verify ground connection (see Section 5.1). Verify that only one of the speed reference inputs (0-10 VDC or 0-20 mA) has been wired (see Section 7.5.3). Check for noise on the analog reference signal. Check the speed reference setting and wiring.

11.3 Replacement Parts

Tables 11.7 and 11.8 list the replacement parts for the 1329I unit.

Table 11.7
Replacement Parts for the 1329I

Description	Part Number
Blower Assembly 1 – 2 HP (All Voltages)	193328
Blower Assembly 3 – 5 HP (460V Only)	193329
Cover with Display and Operator Controls	193330
Cover with Display Only	199331
Control Board (All Units)	199332

Table 11.8
Replacement Bearings

Motor Frame	Part Number	Quantity	Description
56 or 140	416821-56-F	2	6205 ball bearings; double seals with Chevron SRI #2 grease; ABEC 1 tolerances; AFBMA-3 internal tolerances.
180	416821-56F 416821-56G	1 1	

Maintenance Guidelines

ATTENTION: Only qualified personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this instruction manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: After disconnecting input power, wait five minutes and check with a voltmeter to assure that DC bus capacitors are discharged. The voltmeter should read zero volts. Failure to observe these precautions could result in severe bodily injury or loss of life.

ATTENTION: To insure that the driven equipment is not unexpectedly started, turn off, lockout, and tag power source before proceeding. Failure to observe this precaution could result in bodily injury.

Use the guidelines in this chapter to maintain the unit.

12.1 General Unit Maintenance

Check the following at regular intervals:

- Make sure the exterior is kept dry and free of dust, grease, oil, and dirt.
- Make sure the electrical terminal connections, assembly screws, bolts, and nuts are tight.
- Make sure the unit is securely mounted to minimize vibration.

12.2 Motor Maintenance

Enclosed motors require minimal attention. At regular intervals, verify that external air passages of the motor do not become clogged with foreign material that will restrict the flow of air.

The ball bearings are deep-grooved, double-shielded bearings with sufficient lubricant packed into the bearings. You do not need to re-lubricate the bearings.

End of Chapter

Technical Specifications

Unit Ratings

Input Ratings

AC line voltage:

- 380 to 460 VAC, 3-phase
- 200 to 230 VAC, 3-phase
- 200 to 230 VAC, 1-phase
- 115 VAC, 1-phase

AC line frequency:

- 48 to 62 Hz

AC line voltage variation:

- +/-10%

AC line current:

Input Voltage	Unit HP	Input Current
460 VAC	1 HP	2.5 A rms continuous
460 VAC	2 HP	4.2 A rms continuous
460 VAC	3 HP	6.2 A rms continuous
460 VAC	5 HP	9.9 A rms continuous
230 VAC	1 HP	4.5 A rms continuous
230 VAC	2 HP	7.6 A rms continuous
230 VAC, 1-phase	1 HP	5.8 A rms continuous
230 VAC, 1-phase	2 HP	14 A rms continuous
115 VAC	1 HP	14 A rms continuous

Max allowable AC line distribution KVA:

- 100 KVA maximum for 115 VAC to 460 VAC input.

Output Ratings

Horsepower ratings:

- 1, 2, 3 and 5 HP at 460 VAC
- 1, 2 HP at 230 VAC
- 1 HP at 115 VAC

Output voltage:

- 380 to 460 VAC, 3-phase
- 200 to 230 VAC, 3-phase
- 200 to 230 VAC, 1-phase
- 115 VAC, 1-phase

Maximum continuous output current:

Input Voltage	Unit HP	Output Current (Motor Rated Amps)
460 VAC	1 HP	1.7 A
460 VAC	2 HP	3.2A
460 VAC	3 HP	4.5 A
460 VAC	5 HP	6.9 A
230 VAC	1 HP	3.4 A
230 VAC	2 HP	6.4 A
230 VAC, 1-phase	1 HP	3.4 A
230 VAC, 1-phase	2 HP	6.4 A
115 VAC	1 HP	6.8 A

Maximum output current:

Input Voltage	Unit HP	Maximum Output Current (150% Rated Amps)
460 VAC	1 HP	2.55 A
460 VAC	2 HP	4.8 A
460 VAC	3 HP	6.75 A
460 VAC	5 HP	10.35 A
230 VAC	1 HP	5.1 A
230 VAC	2 HP	9.6 A
230 VAC, 1-phase	1 HP	5.1 A
230 VAC, 1-phase	2 HP	9.6 A
115 VAC	1 HP	10.2 A

Important: Maximum current ratings above are for the CT rating. When VT is selected, the maximum output current will be limited to 110%.

Output frequency:

- 3 to 120 Hz

Carrier frequency:

- 8 kHz

Operating Performance

Speed regulation:
- 1% (1% of base speed, 180 to 1800 RPM, constant torque)

Speed range:
- 20:1 (90 to 1800 RPM, constant torque)

Voltage regulation:
- 3% of maximum rated voltage

Power dip ride-through time:
- 500 msec minimum

Drive efficiency:
- >95% (at rated amps, 115-460 V, 60 Hz)

Operating Specifications

Operating temperature:
- 0 to 40°C (32°F to 104°F) ambient

Storage temperature:
- -40°C to 65°C (-40°F to 149°F)

Altitude:
- 1000 meters (3300 feet maximum) without derating. For every 91.4 meters (300 feet) above 1000 meters, derate the current by 1%. Above 3000 meters (10,000 feet), consult your Allen-Bradley Sales Office

Humidity:
- 5% to 95%, non-condensing

Service factor:
- 1.0

Mechanical Specifications

Motor enclosure type:
- Totally enclosed, 24 VDC blower cooled (TEBC)

Required airflow:
- Required clearance for blower intake = 1 in

Protection rating:
- Drive Section is NEMA Type 12, motor is IEC IP54

Drive Protection/Fault Detection

Output overcurrent:

- Trip level = 200% of max peak rated current

Output ground fault:

- Trip level = 200% of max peak rated current

DC bus overvoltage:

Line Voltage	Trip Level
460 VAC	830 VDC
230 VAC	415 VDC
115 VAC	208 VDC

Motor thermal overload:

- Trip time = 1 minute at 150% of rated current (CT)
- Trip time = 1 minute at 110% of rated current (VT)

DC bus undervoltage:

Line Voltage	Trip Level
460 VAC	435 VDC
380 VAC	358 VDC
230 VAC	218 VDC
115 VAC	109 VDC

I/O Specifications

Important: All signals are isolated from the incoming 3-phase power.

Analog inputs

0 to 10 V

Input impedance: 50 kΩ

Resolution: 0.11%

4 to 20 mA

Input impedance: 250 Ω

Resolution: 0.14%

Analog output

0 to 10 V

Minimum load resistance: 2 kΩ

Resolution: 0.4%

Logic inputs (Stop, Start, Reset, Fwd/Rev, RPM/%Load, Function Loss, Preset Speed)

24 VDC sourcing inputs

Maximum input voltage: 28.8 VDC

Input current @ 24 VDC: 10 mA

Maximum OFF state voltage: 5 VDC

Minimum ON state voltage: 15 VDC

Relay output (1 form A N.O. contact)

Maximum current (resistive or inductive): 1 A

Minimum current: 10 mA

Maximum voltage: 28 VDC, 250 VAC

Approvals and Standards Compliance

Approvals:

UL508C CSA 22.2 CE EMC Directive 89/336
LV: EN 50178, EN 60204
EMC: EN 61800-3, EN 50081-1, EN 50082-2

Designed to meet these standards:

FCC Class A and B, ICE 146-1-1, VDE 0871 and VDE 0875

End of Appendix

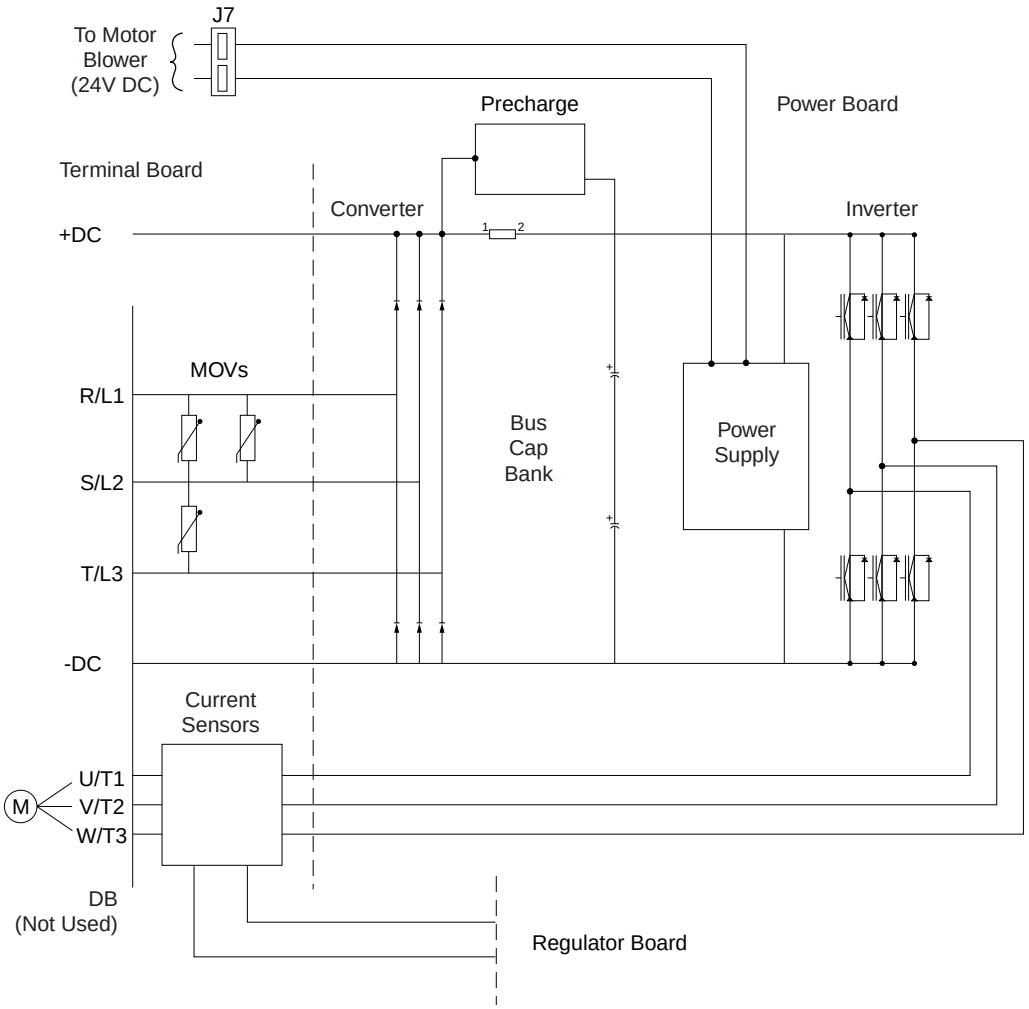
Product Features

The following features are standard on every 1329I unit:

- Totally enclosed standard NEMA frame sizes with C-face and foot mounting are available.
- PWM (pulse-width modulated) Drive Section with a microprocessor-based V/Hz regulator.
- Design B inverter-duty Motor Section:
  - Class F non-hygroscopic insulation system resists heat, oil, and water.
  - Double-shielded bearings.
- Four-character, seven-segment LED display to indicate speed, %load, and diagnostic information.
- 0 to 10 VDC or 4 to 20 mA analog input for remote speed reference from a PLC or process controller.
- 0 to 10 VDC analog output to provide remote speed or %load indication.
- Seven selectable preset speeds.
- Form A contact output to indicate drive running or drive faulted condition.
- 500 ms power dip ride-through time.
- Protection features, including sensing for overtemperature, overcurrent, high DC bus voltage, low DC bus voltage, and surge suppression.
- Conduit cover can be rotated 180° to provide the appropriate display view in each application.
- User-selectable coast-to-rest (default) or ramp-to-rest (user option) stop.
- User-selectable variable torque (default) or constant torque (user option) operation.
- 8 kHz carrier frequency for quiet operation.
- Complies with UL 1995.

End of Appendix

1329I System Diagram



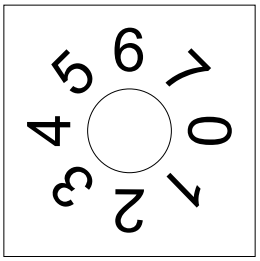
End of Appendix

Installation Record

Catalog Number: _____

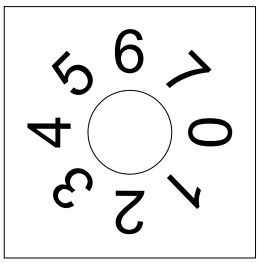
Record the switch settings for your setup in the diagrams below.

Max Speed Switch
(SW2)



0 = 1500 RPM (50 Hz)
1 = 1800 RPM (60 Hz) Default
2 = 2100 RPM (70 Hz)
3 = 2400 RPM (80 Hz)
4 = 2700 RPM (90 Hz)
5 = 3000 RPM (100 Hz)
6 = 3300 RPM (110 Hz)
7 = 3600 RPM (120 Hz)

Accel/Decel Switch
(SW1)



0 = 1 Second Accel/5 Sec Decel
1 = 5 Seconds (Default)
2 = 10 Seconds
3 = 15 Seconds
4 = 20 Seconds
5 = 30 Seconds
6 = 60 Seconds

Setup DIP Switch
(SW3)

			OFF	ON	
Run On Power Up	Disabled	1	☐	☐	Enabled
Speed Reference ❶	Operator Controls	2	☐	☐	Terminal Block
Relay Control Output	Running	3	☐	☐	Faulted
Auto Restart	Disabled	4	☐	☐	Enabled
Torque Curve	Variable	5	☐	☐	Constant
Stop	Coast-to-Rest	6	☐	☐	Ramp-to-Rest
Reverse	Enabled	7	☐	☐	Disabled
Minimum Speed	3 Hz	8	☐	☐	From Terminal Block
Not Used		9	☐	☐	
Not Used		10	☐	☐	

❶ Switch 2 applies to local operator control units only.

End of Appendix

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NOTES

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